The Effects of Organisational Factors on Employee Process Innovation: An Empirical Study of China

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Declaration of Originality

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Jingjing Wang

April 2013

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Abstract

Innovation is essential for organisational competitiveness and success (e.g. Edwards, Delbridge & Munday 2005). However, the existing research mainly focuses on the radical innovation of products; few studies have examined the incremental improvement of processes in relation to daily work (Stamm 2003; Axtell et al. 2000; Genaidy et al. 2010). It is therefore imperative to study the process innovation of employees in the workplace.

Employee innovation can be viewed as a process comprising different stages (Scott & Bruce 1994). However, existing research tends to combine different stages of the innovation process together, resulting in erroneous conclusions regarding the effects of organisational factors on different stages of innovation (Magadley & Birdi 2012). The current study therefore aims to examine the effects of organisational factors including the quality of the supervisor–employee relationship, internal communication, external communication, monetary reward, non-monetary recognition and training on the different stages of employee innovation behaviour that produces incremental refinements and improvements to daily work processes.

Using a convenience sample, a questionnaire survey was conducted with 1,299 organisation employees across four industries in China. The data were analysed using multiple regressions to test the hypotheses. The results show that organisational factors have different effects on the stages of employee innovation. Specifically, the quality of the supervisor–employee relationship, external communication, non-monetary recognition and training were found to play a significant role in facilitating opportunity exploration, while non-monetary recognition and training encouraged idea generation and experimentation. Moreover, the quality of the supervisor–employee relationship, internal communication, external communication, non-monetary recognition and training helped to distribute and promote ideas.

The findings suggest that business managers could utilise organisational resources to improve the innovative behaviour of employees in daily work rather than focusing solely on product innovation. Business managers should also use the correct organisational factors to target different stages of employee innovation in order to maximise employee innovative behaviour.

One limitation of the research lies in its focus on China, which restricted the generalisability of the findings in different situations. Another limitation resulted from using the quantitative method, through which the mechanisms of how organisational factors affect the different stages of employee process innovation could not be revealed. Future research could use qualitative data to shed light in this regard.

This research paves the way for future studies to explore whether the findings also hold for other countries and cultures. Future research is needed to consider the direction of the associations in order to provide evidence of causality.

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List of Abbreviations

CMV	common method variance
EFA	exploratory factor analysis
FDI	foreign direct investment
HK	Hong Kong
HR	human resources
HREC	Human Research Ethics Committee
HRM	human resource management
KMO	Kaiser–Meyer–Olkin LMX
	leader–member exchange
PCA	principal component analysis
SPSS	Statistical Package for the Social Sciences
VIF	variance inflation factor

Chapter 1: Introduction

This chapter provides an introduction to the thesis. It commences with a discussion of the rationale of this thesis. Next, the broad research opportunity is briefly discussed. The chapter concludes with a discussion of the structure of the thesis.

1.1 Background of research on innovation

Innovation is essential for organisational competitiveness and success (McAdam & Keogh 2004; Edwards, Delbridge & Munday 2005). It is widely claimed to have beneficial influences on the effectiveness and long-term survival of organisations (e.g. Amabile 1988; Ancona & Caldwell 1987; Kanter 1988; Mumford 2000; Woodman, Sawyer & Griffin 1993), and it has been widely recognised as an important source of competitive advantage for organisations that want to prosper and grow (Damanpour & Schneider 2006; Tellis, Prabhu & Chandy 2009; Yuan & Woodman 2010). Therefore, it is not surprising that a significant amount of literature has been generated on the subject of innovation, which has become a broad concept that can be defined in many ways (Rowe & Boise 1974; Dewar & Dutton 1986; Rogers 1983; Utterback 1994; Afuah 1998; Fischer 2001; Garcia & Calantone 2002; Kuczmarski 2003; McDermott & O'Connor 2002; Pedersen & Dalum 2004; Frascati Manual 2004).

The literature on innovation is diverse and complex, and it covers many subject and research fields such as organisational behaviour, education and sociology (Smith et al. 2008). Due to the complexities associated with innovation research, it is difficult to generate one grand theory or best practice of innovation (Tidd 2001). Meanwhile, the theories discussed hold true in different circumstances relating to the types (Damanpour 1987; Damanpour, Szabat & Evan 1989) and stages of innovation (Gopalakrishnan & Damanpour 1994).

To clarify the interpretation and usage of the construct of innovation, it is necessary to define the term ‚innovation' and what it is concerned with here. The common features that underlie innovation include the concepts of novelty (King & Anderson 2002), potential usefulness to the organisation (West & Farr 1990) and implementation. Ideas are considered novel if they are unique relative to other ideas currently available; ideas are viewed as potentially useful if they have the potential for direct or indirect value to the organisation (Amabile 1996; Zhou & Shalley 2003). Innovation includes both idea generation and implementation (West 1997; West & Farr 1990), where implementation involves making innovations a part of regular work processes (Kleysen & Street 2001) and developing, testing and modifying them (e.g. Kanter 1988).

In addition, innovation can be radical or incremental in processes (Atuahene Gima 1996; March 1991), related to products or processes (Abernathy & Utterback 1978; Davenport 1993; Han, Kim & Srivastava 1998), and it can be administrative or technical in scope (Damanpour 1991). A brief review of the typology of innovation types is presented below (Damanpour 1991).

For the purposes of this research, the first typology of innovation types relates to the degree of innovation. The types of innovation can range from radical to incremental (Ettlie, Bridges & O'Keefe 1984; Normann 1971). It has been widely agreed that significant differences exist between radical and incremental innovations in terms of their influence on organisations (e.g. Dosi 1982; Christensen 2000).

Radical innovation relates to fundamental changes that represent revolutionary changes in technology; they represent clear departures from existing practice (Ettlie 1983; Ettlie, Bridges & O'Keefe 1984; Urabe 1988). Such changes refer to discontinuous events that result from deliberate research and development activity (Freeman & Perez 1988). In particular, radical innovation can be considered new technology or a combination of technologies that are induced commercially to meet users' or markets' needs (Abernathy & Utterback 1990). Radical innovation typically includes aspects regarding high market and technological uncertainty, new market creation and current product cannibalisation (Hurmelinna-Laukkanen,

Sainio & Jauhiainen 2008). Radical innovation tends to be closely relevant to unexpected changes in technology for products or services that might create high levels of uncertainty in organisations.

In contrast, incremental innovation refers to changes that mainly reinforce the existing capabilities of organisations (Dewar & Dutton 1986; Ettlie, Bridges & Keefe 1984; Henderson & Clark 1990). While radical innovation regarding major breakthroughs in the development of new products tends to originate in research and development (R&D) (Stamm 2003), incremental innovation concerning incremental modifications in procedures at work (Mumford & Gustafson 1988) typically tends to be generated and developed within a cross-functional context (Stamm 2003).

However, few theorists explicitly research small-scale incremental innovations, that is, looked like less significant and minor changes and improvements in the work. This presents a research opportunity to examine the minor changes and improvements in employees‘ daily work.

Innovations can vary in content; specifically, previous research has proposed that innovation can range from product innovation to process innovation (e.g. Patterson & Lightman 1993). Product innovation or new product development refers to the development of new or improved products. Product innovation has been a central topic in innovation research (e.g. Brown & Eisenhardt 1995; Clark & Fujimoto 1991; Cohen & Levinthal 1990; Cooper & Kleinschmidt 1986; Leonard-Barton 1992; Sanchez & Mahoney 1996; Teece 1986; Ulrich & Eppinger 2008; Zirger & Maidique 1990). Conversely, process innovation corresponds to the sequences and nature of production processes. According to Afuah (1998), process innovation is concerned with introducing new elements into an organisation‘s operations—for example, changing task specifications, improving work and information flows, and producing a product or service using equipment.

From the above discussion, innovation can range from small-scale ideas relating to improvements in daily work processes and work designs to the development and implementation of new ideas that innovate theories, practices or offerings

regarding products and/or services across the organisation (Axtell et al. 2000). This implies that, in addition to the development of new offerings such as improved products or services to the market, the contents of innovation can be relevant to the methods of doing jobs and changes relating to organisational characteristics such as the structure of organisations.

Compared with product innovation, process innovation is usually more difficult to detect, but it is also very important (Propris 2002). Process innovation that relates to the development of new or improved processes is related to employee‘s daily work performance. However, there is a lack of understanding regarding what the employee perceives as motivating for engaging in innovative behaviour towards work processes. Process innovation has received much less attention (e.g. Davenport 1993; Ettlie & Reza 1992; Hatch & Mowery 1998; Pisano 1997; Reichstein & Salter 2006). This raises a question regarding whether radical product innovation theory works in the same way when applied to the area of innovation towards small-scale improvements and refinements in existing work processes. The next section reviews the literature on process innovation.

1.2 Process innovation of employees

The importance of employee innovation is not limited to R&D employees or knowledge workers, and employees may generate innovative ideas in any job (e.g. Madjar, Oldham & Pratt 2002; Shalley, Gilson & Blum 2000; Shalley, Zhou & Oldham 2004). Everyone has the potential to be innovative, and innovation can come from anywhere within an organisation (Amabile 1996). For example, employees need to be innovative to solve day-to-day problems and to provide input to organisations‘ innovations (Genaidy et al. 2010). Thus, the importance of the incremental process innovation of employees concerning non-technological improvements in their daily work should not be ignored.

Whether radical or incremental, innovative behaviour by employees is at the root of every innovation (Glynn 1996). To meet the needs of global competition and the uncertain environment, organisations need their employees to undertake not

only basic duties, but also make extra efforts to act beyond the routine performance of their duties (Axtell et al. 2000) in order to engage in innovative behaviour in work processes. Employee innovative behaviour has been proposed as an important asset that enables an organisation to succeed in a dynamic business environment (Tortoriello & Krackhardt 2010). This illustrates that the innovative behaviour of employees deserves research attention.

Specifically, ideas generated by employees can range from small, incremental refinements in procedures to radical, major breakthroughs in the development of new products (Dewar & Dutton 1986; Madjar, Greenberg & Chen 2011; Mumford & Gustafson 1988). Among these, technological product innovations regarding significant technological improvements of products were the most researched (e.g. Chandy & Tellis 1998; Flor & Oltra 2004), but only a few studies explicitly examined non-technological process innovation—that is, incremental modifications to everyday work processes. Moreover, some innovation studies did not specify which type of innovation they examined (Damanpour 1991), which can lead to erroneous conclusions if theory in employee innovation work in different ways for different types of innovation. Consequently, while few studies explicitly examined innovation towards small-scale improvements and refinements in existing work processes (Axtell et al. 2000), the present study exclusively examines incremental innovation regarding small-scale refinements in everyday work processes.

1.3 Background of employee innovation of China

China is the largest transition economy in the world (Prasad 2004). In the 2000s, China reported double-digit annual gross domestic product (GDP); thus, by 2012, annualised GDP growth was 7.8% (National Bureau of Statistics of the People‘s Republic of China 2008: 865). China was generally viewed in terms of its astonishing growth as a manufacturing economy, and it has emerged as an exporting country (Girma, Gong & Gorg 2009). Additionally, China has experienced phenomenal growth in foreign direct investment (FDI) (Warner 2004). However, the environment has recently been changing dramatically. In particular,

FDI projects showed a rapid downward trend from 2008 to 2009 (An, Shi & Chi 2010). A further increase of exports is limited by the world‘s market demands, which are subject to fluctuations in the world economy and intensifying competition from other countries.

In such a changing environment, it is important for China to identify new drivers in order to maintain its economic growth. Innovation is another facilitating force to improve efficiency and competitiveness in an organisation through innovative activity. Innovation allows organisations to develop new processes to produce existing goods more efficiently or to develop new products that allow them to grow (Girma, Gong & Gorg 2009). According to Jiang, Wang and Zhao (2012), western organisations increasingly have business relations or establish branches in China, and these organisations are interested in how to facilitate employee innovation. Innovation in Chinese organisations requires more research.

However, although existing literature indicates that organisational factors are related to employee innovative behaviour (e.g. Zhang & Bartol 2010; Wei, Liu & Herdon 2011), research on employee innovative behaviour in the workplace has rarely been conducted in a non-western context. As Jackson and Bak (1998) noted, it would appear that management is not sufficiently aware of which factors may and may not work in a different context. Specifically, few recent empirical studies have examined the link between organisational factors and employee process innovation towards incremental refinements in daily work in the Chinese context. It has been proposed that western theories might not work in China (Jackson & Bak 1998), but current work has not gone any further to discuss how or why they might differ. Applying existing western theories in China can determine whether there are differences so that people can understand which theories, if any, might not hold in China. In particular, questions remain regarding whether western theory works in the same way when applied in the Chinese context. Do western practices matter in terms of the influence on employee innovation in China?

Thus, it is worthwhile to examine whether western theories of employee innovation can be utilised in the Chinese context and whether employee innovation can be affected by organisational factors. By doing so, this study

expects to provide suggestions for practicing managers in China who are keen to encourage employee innovation and therefore improve the competitiveness of organisations.

1.4 Research opportunity for the thesis

The present study addresses the research need by extending research on the influence of organisational factors on employee innovation—in particular, on employees‘ behaviour in innovation processes. Specifically, in line with the preceding discussion, the research opportunity for investigation in this thesis is the influence of organisational factors on employees‘ behaviour towards refinements and increasing the efficiency of existing practices and processes in daily work in China. By doing so, this study is expected to advance the understanding of what motivates employee innovative behaviour in process innovation. It is one of the first studies to apply western innovation theories to China.

1.5 Structure of the thesis

This thesis proceeds in six chapters. Chapter 2 provides a theoretical background of employee process innovation and its link with organisation-related factors. Chapter 2 also discusses the specific research questions to be addressed in this thesis, as well as hypothesis developments. Chapter 3 outlines the research method adopted in this study. Chapter 4 presents the results of the quantitative analysis of the data gathered in this research. Chapter 5 provides a discussion of the key findings as they relate to the proposed hypotheses and research questions posed in Chapter 2. Chapter 6 presents the theoretical and practical implications, and it recommends future research opportunities.

Chapter 2: Literature Review and Hypotheses Development

The objectives of this chapter are three-fold. First, it provides an account of the theoretical development of the stages of employee innovation perspectives, and it briefly outlines the main findings in this research area. Second, it discusses the link between employee innovation and supervisor–employee relationships, internal communication, external communication, monetary reward, non-monetary recognition and training. Finally, as an integration of these theoretical developments, the chapter presents the specific research focus addressed in this thesis, as well as the hypotheses tested in this research.

2.1 Stages of employee innovation

Innovation is a long and cumulative process (Drazin, Glynn & Kazanjian 1999; Shi 2012) that ranges from generating new ideas to implementing them into a new product, process or service (Urabe 1988). In this way, employee innovative behaviour can be viewed as a process of behaviour towards generating and developing new ideas for incremental refinements and improvements in everyday work processes, regardless of the ultimate success of these new phenomena (e.g. Scott & Bruce 1994; Clegg et al. 2002).

Accordingly, models of employee innovation (e.g. Scott & Bruce 1994; Janssen 2000; Rank et al. 2004; Holman et al. 2012) have highlighted the key stages of the innovation process. There is strong evidence to support the existence of at least two broad overlapping innovation stages: idea generation and idea implementation (Amabile 1988; Wolfe 1994; Mumford et al. 2002; Axtell et al. 2000).

Specifically, employee innovation begins with the generation of novel and useful ideas (Amabile et al. 1996; Kanter 1988; Woodman, Sawyer & Griffin 1993). At this stage, employees working in groups or on their own are expected to come up

with ideas in response to a problem or a perceived need for innovation (Magadley & Birdi 2012). Incongruities, discontinuities, perceived work-related problems and emerging trends are often instigators of the generation of novel ideas (Drucker 1985). This stage can be an important prerequisite for innovation (Scott 1995).

The next stage is idea implementation, which has been viewed as ‚the transition period during which targeted organisational members ideally become increasingly skilful, consistent and committed in their use of an innovation' (Klein & Sorra 1996: 1057). This stage includes making innovations a part of regular work processes (Kleysen & Street 2001) and developing, testing and modifying them (e.g. Kanter 1988).

Some studies (e.g. Janssen et al. 2004; Oldham & Cummings 1996; Scott & Bruce 1994, 1998) further expanded this stage perspective by proposing that once an employee has generated an idea, he or she must engage in social activities to find sponsors surrounding an idea or to build a coalition of supporters who provide the necessary power behind it (Galbraith 1982; Kanter 1988).

However, as Kleysen and Street (2001) argued, measures of employee innovative behaviour often assessed only one dimension of the construct. To develop a multi-dimensional measure of employee innovative behaviour, Kleysen and Street (2001) conducted a systematic literature review and identified five dimensions of employee innovative behaviour: opportunity exploration, generativity, formative investigation, championing and application. Specifically, opportunity exploration refers to extensive exploration into innovative opportunities in order to discover more related knowledge; generativity refers to behaviour that facilitates reforms to members, products, work procedures, services and organisations; formative investigation refers to different concepts, solutions and comments that are compiled, surveyed and tested; championing refers to different social and political behaviours in the innovation process; and application refers to innovations that are utilised into daily routines within an organisation. Unfortunately, Kleysen and Street's (2001) study did not lend empirical support to a multi-dimension measure with five distinct subscales according to the dimensions derived from the

literature. However, their findings suggest that employee innovation includes more than one dimension, and future research could continue to reflect the richness of the construct of employee innovative behaviour.

The review of the existing research on the stages of the innovation process indicates that the employee innovation process typically encompasses a broad set of behaviours related to the generation of ideas, creating support for them and helping their implementation (e.g. Scott & Bruce 1998; Janssen 2000; Rank et al. 2004). These behaviours were dealt with previously as key steps in the process of individual innovation (Axtell et al. 2000; Krause 2004; Dorenbosch et al. 2005). However, previous studies often assessed only one dimension of employee innovation, whereas Kleysen and Street (2001) noted that employee innovation includes more than one dimension.

Further, although it has been proposed that employee innovation process can be seen as a process, existing research tends to combine different stages of the innovation process, resulting in an erroneous conclusion regarding the effects of organisational factors on different stages of innovation (Magadley & Birdi 2012). Little attention has been devoted to the possibility that the factors that affect the idea generation stage may differ from those that promote their implementation (Axtell et al. 2000; Magadley & Birdi 2012). Future research is needed to separately examine the stages of the employee innovation process.

Additionally, the majority of studies on innovation have focused on the idea generation stage (Axtell et al. 2000; West 2002; Magadley & Birdi 2012). However, innovation does not occur when a new idea is generated; it occurs when the new idea is put into practice (Damanpour 1987; Choi & Chang 2009). In support, recent researchers (e.g. Axtell et al. 2000; Dul & Ceylan 2010; Mumford 2003; Oldham & Cummings 1996; Scott & Bruce 1994; Unsworth 1999) have proposed that the scope should be extended and for more attention to be paid to other stages, such as the implementation of ideas. A comprehensive perspective on the employee innovation process is needed.

In response to the above issues, process perspective is taken by the present study. Following Dul and Ceylan (2010), employee innovation is viewed here as a multi-stage process from opportunity exploration to idea generation and experimentation, and to idea promotion. These are not limited in space and time. Further, as the work environment is a highly important influence in terms of facilitators or inhibitors of creative behaviour (Amabile 1983; Farmer, Tierney & Kung-McIntyre 2003; Mumford & Gustafson 1988; Sternberg & Lubart 1996), organisations may encourage innovation by using their resources. This study envisions a role for organisations to encourage and motivate employee innovation by leveraging common organisation-related resources. The literature on the influence of organisations on employee innovation is reviewed in the following sections.

2.2 Organisation and employee innovation in workplaces

2.2.1 Introduction

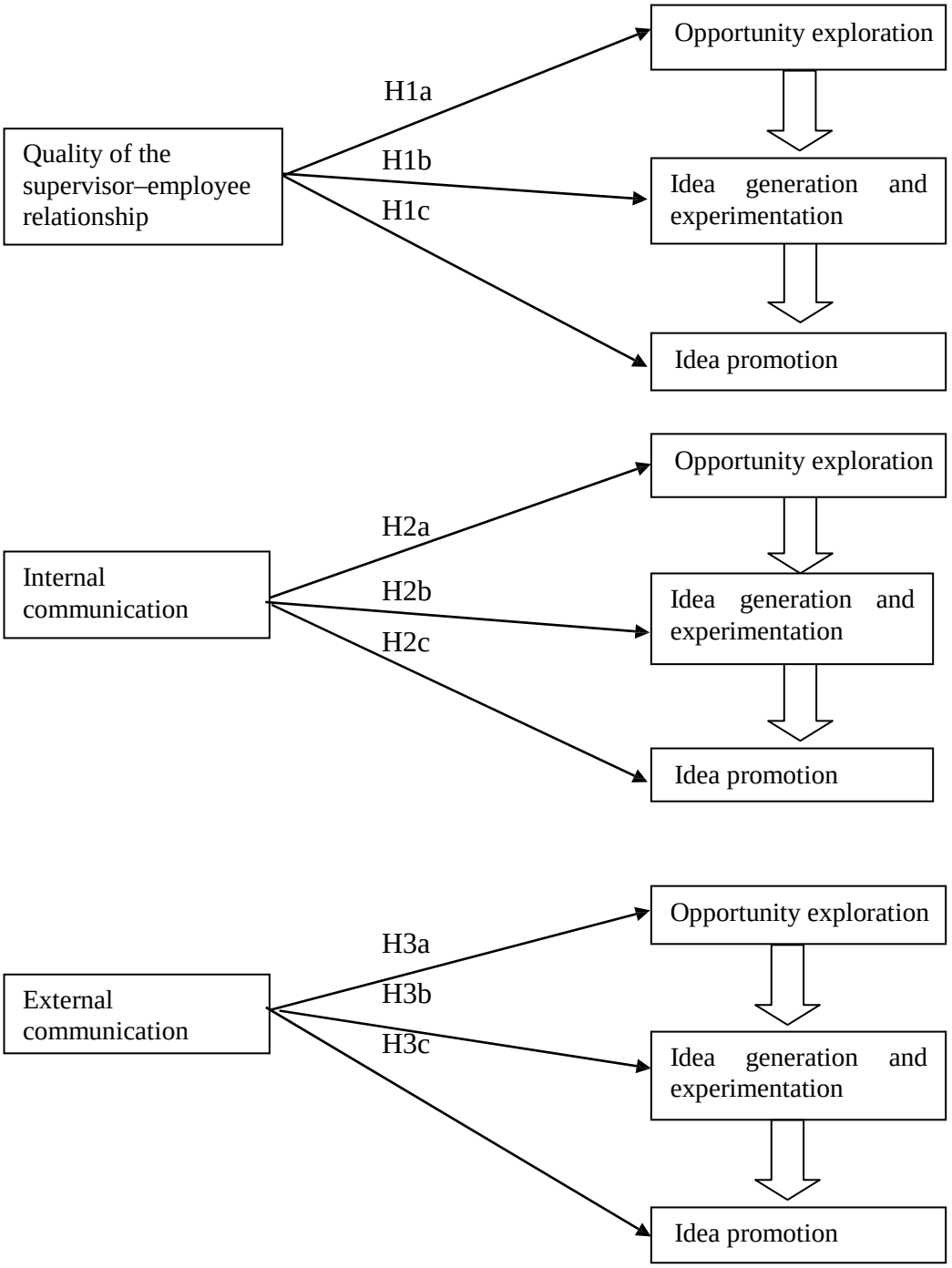
Employee innovative behaviour has been widely proposed to be crucial for the effective functioning and long-term survival of organisations (e.g. Amabile 1988; Ancona & Caldwell 1987; Kanter 1988; Oldham & Cummings 1996; Shalley 1995; Van de Ven 1986; West & Farr 1989, 1990; Woodman, Sawyer & Griffin 1993). In view of evidence, employee innovation is essential for organisations (e.g. Lu & Li 2010), and it is highlighted that the generation of new ideas and the translation of these ideas into useful practices are functions of interactions between employees and situations (Amabile 1997; Scott & Bruce 1994; Hunter, Bedell & Mumford 2007). In this way, theory and research have sought to understand how innovation can be fostered or encouraged in the workplace by identifying personal and contextual factors that influence employee innovation (e.g. Amabile 1988; Kanter 1988; Mumford 2000), including personal differences and characteristics (Bunce & West 1995; Barron & Harrington 1981; Feist 1999), organisation culture and climate, relationships with supervisors (Yuan & Woodman 2010), job characteristics (Oldham & Cummings 1996) and social context (Yuan & Woodman 2010).

Among these, a large body of literature has focused on identifying personal characteristics and attributes associated with innovative achievement (Amabile et al. 1996; Barron & Harrington 1981; Davis 1989; Martindale 1989; Williams & Yang 1999), and generation of ideas is viewed as individual asset (Sternber & Lubart 1999). These studies (e.g. Amabile 1983; Oldham & Baer 2011) have found that a stable set of core personal characteristics, such as aesthetic sensitivity, toleration of ambiguity and self-confidence, relate positively to innovative performance. However, while studies on innovation at the employee level mainly focus on the characteristics of creative people, personal characteristics such as the intelligence or personality of employees may be predetermined before they join organisations, which could be difficult for organisations to change and control.

Meanwhile, for innovation to occur in organisations, management needs to support and promote it, as they have considerable influence over the context within which idea generation can occur (Shalley & Gilson 2004). More recent research has started to examine the effects of contextual factors on employees‘ innovative performance (e.g. Shalley 1991, 1995). In this way, the context in which an employee performs a task influences his or her intrinsic motivation, which in turn affects innovative achievement (Amabile 1988). Specifically, previous studies suggested that employees generate many ideas for improving their organisation when they have complex and challenging jobs (Hatcher, Ross & Collins 1989) and when they participate in decision-making (Axtell et al. 2000). In addition, it suggests that employees are most likely to engage in activities that promote their ideas when both a supportive work context is present and they have a proactive personality (Seibert, Kraimer & Crant 2006).

The literature reviewed above suggests that management should consider these factors if they are interested in maximising their employees‘ innovative behaviour in the workplace, and a supportive work context plays an important role in supporting and encouraging employees‘ innovative efforts (Anderson 1975; Pelz 1956; Scott & Bruce 1994; Taylor, 1963, 1972). Accordingly, this study next reviews six organisational factors that may influence employee innovation, including, supervisor–employee relationship, internal and external communication, monetary reward and non-monetary recognition, and training suggested by

previous theory and research as important factors for innovation. These six factors also are seen as the common organisation resources for most organisations to leverage. The proposed model shown in Figure 2.1 summarises these relationships, and the present study reviews the logic of the hypothesised model in the following sections.



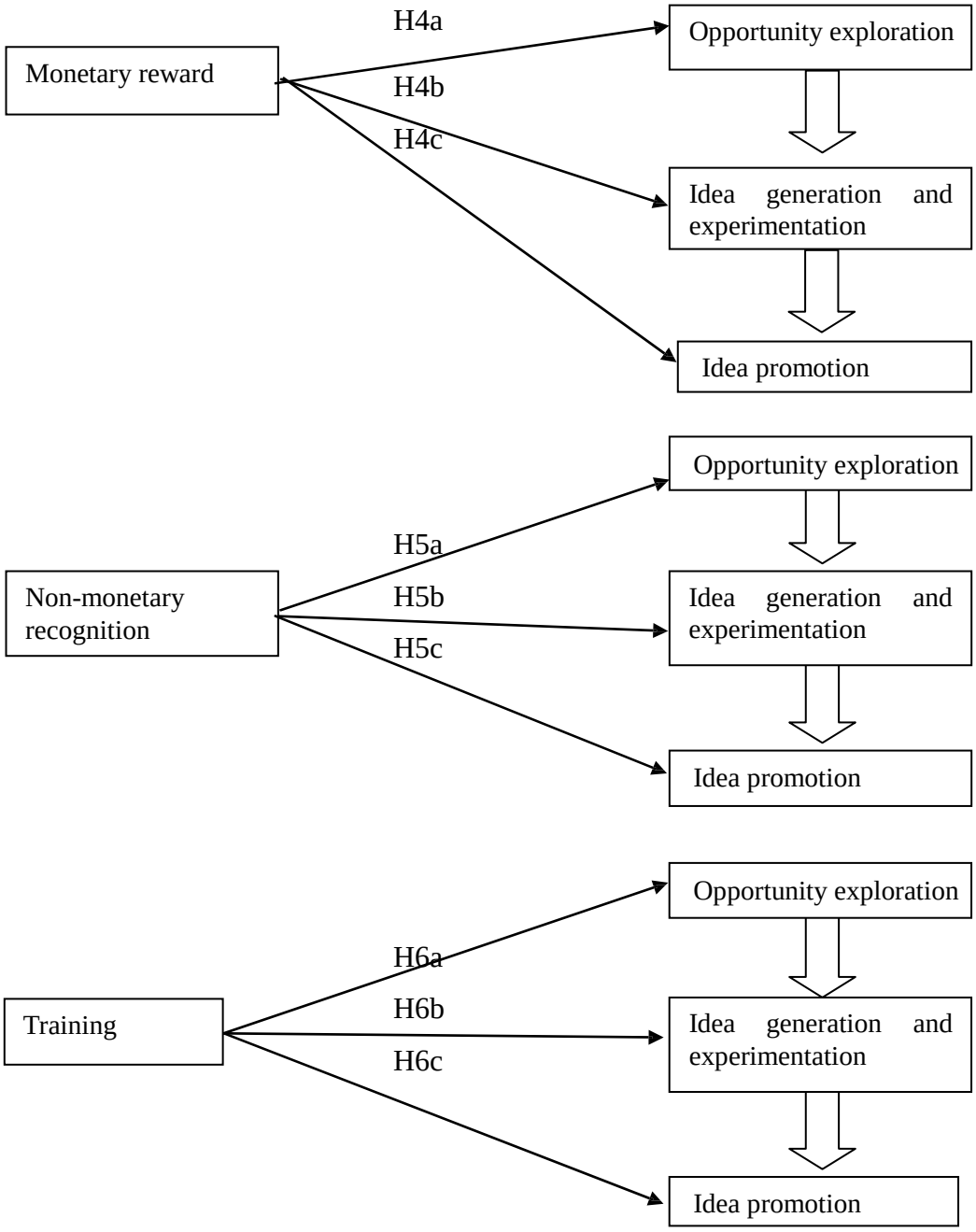


Figure 2.1: Proposed theoretical model

2.2.2 Leadership

2.2.2.1 Introduction

According to De Jong and Den Hartog (2007), leadership can be viewed as the process of influencing others towards achieving desired outcomes. The importance of an effective leader for influencing employee innovation has been recognised (e.g. Basadur 2004; De Jong & Den Hartog 2007). The role of leaders

is to provide a structure for the innovation process for employees (Isaksen & Tidd 2006).

Specifically, previous research on the relationship between a leader‘s behaviour and employee innovation has investigated different leadership styles, including transformational leadership, participative leadership and leader–member exchange (LXM) theory. These studies demonstrated a positive relationship between transformational leadership and creativity (Kahai et al. 2000; Shin & Zhou 2003), and a positive relationship between employee innovative behaviour and employee participation (Axtell et al. 2000).

While the influence of leaders‘ behaviours on employee innovation has been discussed in general (e.g. Oldham & Cummings 1996), there is little research on how leaders may facilitate the cognitive and emotional processes of daily work in employees (Isaksen & Tidd 2006). In addition, it should be noted that leadership can be a complex interaction between the designated leader and the social and organisational environments (Fiedler 1996). Some scholars suggest that leadership implies an interpersonal interaction procedure between leaders and subordinates (Jacobs 1970; Bass 1985; Robbins & DeCenzo 2001). In this way, leadership can be viewed as a social process that engages everyone in the community (Barker 1997; Drath & Palus 1994; Wenger & Snyder 2000).

Speaking of such an influence, the LMX theory proposes that the quality of the leader–follower relationship influences outcomes such as employee satisfaction, supervisor satisfaction, performance and commitment (Yukl 2002). In particular, for its influence on employee innovation, extant literature suggested that leader–subordinate relationships have positive effects on innovative behaviour (e.g. Janssen & Van Yperen 2004). Leaders support innovation by providing support in risky and challenging tasks, the provision of task-related resources and recognition, which all facilitate individual innovation. More recent meta-analytical findings showed that in terms of supervisor support, LMX is positively related to the innovative behaviour of followers (Harrison et al. 2006). This is because when leaders and followers have good exchanges or high-quality, effective LMX relationships, they share mutual trust, respect and obligations

(Graen 1976; Graen & Schiemann 1978; Graen, Novak & Sommerkamp 1982a, 1982b), positive support, common bonds, open communication, shared loyalty (Dansereau, Graen & Haga 1975; Dienesch & Liden 1986; Graen & Uhl-Bien 1995) and affection (Liden, Wayne & Stilwell 1993).

The following section reviews the literature regarding the general nature of LMX theory for employee innovation. This is followed by a review of the literature in relation to its influence on process innovation. Finally, this study will research the influence of supervisor–employee relationships according to the stages of the employee innovative process.

2.2.2.2 LMX theory and employee innovation

Graen et al. developed the LMX theory (Dansereau, Graen & Haga 1975; Graen 2006; Graen & Uhl-Bien 1995; van Breukelen, Schyns & Blanc 2006). According to Graen et al. (2004) and Schriesheim et al. (1992), the term ‚leader–member relationship' implies a relationship between a manager and his or her direct-report employees. This term may refer to a relationship between high-level personnel and low-level personnel who directly report to him or her. The term ‚supervisor–subordinate relationship' in this study can be categorised as one application of the leader–member relationship given that the supervisor is a higher level of authority than the employee who usually reports directly to him or her.

This LMX theory is widely accepted in the management literature to explain the development of a leader–employee relationship and the quality of such a relationship (e.g. Berneth et al. 2007b; Gerstner & Day 1997; Makela 2005; Scherbaum et al. 2006; Sias 2005; van Breukelen, Schyns & Blanc 2006). It has been widely used to evaluate the quality of the supervisor–subordinate relationship (e.g. Fix & Sias 2006; Lee 2001; Sias 2005).

Recent research indicates that LMX relationships are related to employee creativity (e.g. Tierney, Farmer & Graen 1999). According to Tierney, Farmer and Graen (1999), effective LMX relationships are positively associated with employee creativity where creativity refers to the production of novel and useful

ideas by an individual or a group of individuals working together (Amabile 1988; Madjar, Oldham & Pratt 2002; Shalley, Gilson & Blum 2000; Zhou & Shalley 2003). This finding is supported by related research (e.g. Scott & Bruce 1994). Janssen and Van Yperen (2004) also found that high-quality relationships have a positive effect on the broader construct of innovative behaviour.

Preliminary support for the LMX–creativity link was provided (Scott & Bruce 1994), and studies were conducted to investigate the influence of supervisor–employee relationship quality on the generation of ideas (e.g. Tierney, Farmer & Graen 1999; Shalley & Gilson 2004); however, its influence on the employee innovative process by stages (i.e. opportunity exploration, idea generation and experimentation of employees, and the idea promotion of employees) has received little attention. As Denti and Hemlin (2012) suggested, this poses the problem that if the influence of supervisor–employee relationship quality on the stages of the employee innovative process differs from each other, this will not be evident. In response to this issue, they suggested that the stages of the innovation process are one direction for future research on the influence of leaders on innovation. Given the dominant role of leaders in the workplace, research is still needed to identify the myriad of interacting leader and employee factors that may influence the different stages of the employee innovative process.

2.2.2.3 LMX theory for process innovation

The distinction between incremental innovation (i.e. expanding and refining existing products or processes) and radical innovation (i.e. creating new and novel products) may be an important issue in future research and in theoretical modelling of leadership and innovation (e.g. Isaksen & Tidd 2006). For example, Jansen, Vera and Crossan (2009) found that transactional leadership is positively related to incremental types of innovation (i.e. innovation towards refinements of existing products and increasing the efficiency of existing practices and processes) but negatively related to radical innovation. Along these lines, Denti and Hemlin (2012) suggested that examining the influence of leadership research for specific types of innovation might be one direction for future research on innovation and leadership.

Few theorists explicitly research the effect of supervisor–employee relationship quality on process innovation, and empirical studies that explicitly examined its effect on process innovation types are still scarce. Therefore, the present study exclusively examines the influence on employee process innovation towards refinements and increasing the efficiency of existing practices and processes in the daily work, as well as attempts to fill the gap in the existing work by investigating the influence on the different stages of the employee innovative process.

2.2.2.4 Hypotheses development

Supervisor–employee relationship quality refers to the quality of the interpersonal exchange relationship between an employee and his or her supervisor (Graen & Uhl-Bien 1995). Following Graen and Uhl-Bien (1995) and others (e.g. De Jong & Den Hartog 2007), the present study views the quality of the supervisor–employee relationship as a continuous variable that is defined as employees‘ perceived quality of work relationship with his or her supervisor. Following Liden, Wayne and Sparrowe (2000), the quality of this relationship determines the amount of physical or mental effort, material resources, information and social support that is exchanged between the supervisor and the employee.

The quality of the supervisor–employee relationship is expected to be positively associated with employee process innovation for the following reasons. Several theorists have proposed that the nature of LMX appears to be compatible with employees‘ innovative actions because LMX quality focuses on the dyadic social exchange between supervisors and employees (Graen & Cashman 1975; De Jong and Den Hartog 2007). Previous research (Dunegan, Tierney & Duchon 1992; Scott & Bruce 1994) showed that high LMX employees believe they operate in a context that is supportive of innovative work. High LMX employees are more likely to engage in job-related risk-taking (Graen & Cashman 1975) and to receive more task-related resources (Graen & Scandura 1987) and recognition (Graen & Cashman 1975; Grean & Scandura 1987; De Jong & Den Hartog 2007). Employees in such relationships frequently interact with their supervisors and have their supervisors‘ support, confidence, encouragement and consideration. In addition, they take on added duties or expend extra effort to achieve work goals

beyond contractual or transactional expectations (Sparrowe & Liden 1997). As a result, they tend to be more innovative in their daily work process (i.e. towards incremental process innovation).

Additionally, we would more closely examine the influence of supervisor–employee relationship quality on the employee innovation process stage by stage for a number of reasons. Previous studies have indicated that employees‘ innovative behaviour can be significantly influenced by interactions with their leaders (Yukl 2002; Basadur 2004). Following De Jong and Den Hartog (2007), leaders influence employees‘ innovative behaviour both through their deliberate actions, which aim to stimulate idea generation and application, as well as by their more general, daily behaviour. This indicates that future quantitative research could further examine whether leaders‘ practices might have differing influences on different stages of the employee innovative process (e.g. employees‘ idea generation and/or application behaviour) (De Jong & Den Hartog 2007). Along this direction, Axtell et al. (2000) suggested that employees with more supportive managers were more likely to have their ideas implemented.

While scholars have long commented on the influence of leadership—specifically the supervisor–employee relationship on employee innovation—few empirical studies have been conducted to test this influence on employee process innovation stage by stage. As a result, on the basis of theoretical arguments and previous studies that demonstrate links between the quality of the supervisor–employee relationship and the stages of the employee innovative process towards incremental improvements in daily work processes, this study includes the following hypotheses:

H1a: Quality of the supervisor–employee relationship is positively associated with the opportunity exploration of employees.

H1b: Quality of the supervisor–employee relationship is positively associated with the idea generation and experimentation of employees.

H1c: Quality of the supervisor–employee relationship is positively associated with the idea promotion of employees.

2.2.3 Communication

2.2.3.1 Introduction

With regard to the organisational factors related to the capacity of a company to innovate, there exists a widely accepted agreement concerning the importance of communication, including communication with outsiders and communication within the organisation (Allen 1977; Tushman 1977; Miller & Friesen 1982; Souder 1987; King 1990; Damanpour 1991; Souder & Sherman 1993). Many researchers have proposed that the innovation process essentially refers to communication and information-processing activities (e.g. Allen 1985; Brown & Utterback 1985; Ebadi & Utterback 1984; Fidler & Johnson 1984; Souder & Moenaert 1992; Tushman 1979a, 1979b; Nadler & Tushman 1980), and that innovation is fundamentally a collaborative effort (Subramaniam & Youndt 2005). A large number of empirical studies have revealed that higher levels of communication and information gathering are associated with organisational innovation in general (Aiken & Hage 1971; Evan & Black 1967; Kanter 1982, 1988a; Tjosvold & McNeely 1988) and higher levels of performance in R&D project groups in particular (Katz 1982; Keller 1986; Keller & Holland 1983; Pelz & Andrews 1966).

As can be seen, existing work has proposed that communication could promote an organisation to innovate. At the employee level, recent research has suggested that employee creativity and innovation can be viewed as a social process (e.g. Amabile 1983; Madjar, Oldham & Pratt 2002; Axtell et al. 2000; Woodman, Sawyer & Griffin 1993). In this way, previous studies have focused on the consequences of social networks for employee creativity and innovation (e.g. Obstfeld 2005; Perry-Smith 2006).

In this respect, a large body of literature has stressed the importance of social networks for innovation and pointed to its importance for information flow, the exchange of ideas and access to resources from diverse contacts (Hemphälä &

Magnusson 2012). The rationale for the importance of innovation is that diversity within teams implies greater creativity and innovation due to the differences in knowledge, experience or information among members (Harrison & Klein 2007). Drawing on the social network theory, Perry-Smith and Shalley (2003) also suggested that contacts with diverse associates or external to the firm were expected to enhance important creativity-relevant skills, which refer to the ability to think creatively, such as to generate alternatives. They found that employees with more diverse networks were more exposed to non-redundant information, which would boost deviant behaviour such as opportunity and championing ideas (Perry-Smith & Shalley 2003). Obstfeld (2005) also showed that engineers with dense social networks were more engaged in developing new products or processes. This indicates that having contacts with associates that are both internal and external to the organisation could enhance employee creativity and innovative work behaviour.

Along with the social network perspective, previous studies have showed that employee innovative behaviour can be influenced by interpersonal communications and interactions with others at work (e.g. De Jong & Den Hartog 2010). The literature on organisational culture suggested that open and transparent communication that is based on trust will have a positive influence on promoting creativity and innovation in general (Barret 1997; Robbins 1996). Previous research (Binnewies, Ohly & Sonnentag 2007; Perry-Smith 2006; Perry-Smith & Shalley 2003) has showed that communication about ideas can serve different functions for creativity. Several theorists have proposed that the communication of ideas and information with others should enhance exploring and generating ideas and lead to higher levels of creativity (Amabile 1988, 1996; Ford 1996; Gilson 2001; Kanter 1988; Perry-Smith & Shalley 2003; Woodman, Sawyer & Griffin 1993, 2003) where such diversity is particularly relevant to employee creativity and includes differences in terms of background, areas of specialisation and work responsibilities (e.g. Amabile et al. 1996; Andrews 1979; Payne 1990).

Specifically, extant literature highlighted the importance of communicating outside organisations, such as with customers for creativity and innovation (e.g. Damanpour 1991). It has been suggested that external communication assists

managers‘ development of knowledge about the external environment, leading to proposals for new ideas for adoption (Damanpour & Schneider 2006).

It is worth noting that, while preliminary support for diverse work contact networks–creativity has been provided (e.g. Perry-Smith & Shalley 2003; Perry-Smith 2006; De Jong & Den Hartog 2010), the influence of having such work contacts on the stages of the employee innovation process received little attention. Most studies tended to focus on either creativity (e.g. Gilson 2001) or employee innovative behaviour in general (e.g. De Jong & Den Hartog 2010). This poses the problem that, if the influence on the stages of the employee innovative process of having such work contacts differs from each other, this will not be evident.

In response to this issue, Perry-Smith and Shalley (2003) suggested that future research needed to empirically explore the social side of individual innovation. Further, Perry-Smith (2006) suggested that it would be helpful for future research to study the effect of social network relationships on various stages from idea generation to implementation. In particular, as Hemphälä and Magnusson (2012) suggested, because different innovations depend on different contingencies, in terms of social networks, it is important for future research to make further distinctions between different stages of innovation. Thus, one direction for making further distinctions is idea generation and idea implementation. This suggests that future quantitative research could more closely examine whether the effect of communication networks might be different stage by stage.

The following section reviews the literature on both external and internal communication research for employee innovation. This is followed by a review of the influence on process innovation in particular. Finally, the study investigates the influence of communication according to the stages of the employee innovative process.

2.2.3.2 Internal communication and employee innovation

According to Frank and Brownell (1989), employee communication is viewed as the communication transactions between individuals and/or groups at various

levels and in different areas of specialisation within organisations, which are intended to design and redesign organisations, to implement designs and to coordinate day-to-day activities. As Cummings and Oldham (1997) suggested, creative employees need to be surrounded by colleagues who stimulate them to become passionate about their work but who do not distract them from it. This implies that communication with colleagues within organisations might be important for stimulating innovation in employee work processes.

In this respect, extant literature has addressed the link between relationships with colleagues and creativity (e.g. Perry-Smith & Shalley 2003). Perry-Smith and Shalley (2003) suggested that employees who have frequent interactions with their colleagues tend be less innovative than those who maintain less frequent relationships. The rationale for this is that while frequent interactions develop between similar individuals, less frequent interactions with colleagues are more likely to connect people with differing points of view, varying interests and different ways of tackling problems, and these favour creativity. This corresponds to the fact that, as Muñoz-Doyague and Nieto (2012) suggested, exposure to various approaches and perspectives could stimulate creative abilities such as the capacity to generate alternative approaches, while access to more information could increase the type of knowledge that is relevant for creativity.

Along these lines, prior research stressed the importance of communication among employees at work for employee innovation by highlighting sharing and the exchange of information and diverse ideas. For example, according to Van de Ven (1986), effective internal communication allows employees to share their knowledge and past experiences, and to exchange and discuss ideas, which is especially significant for the generation of new ideas. Similarly, following Andrews and Smith (1996), interactions with other functional areas enhances creativity. Monge, Cozzens and Contractor (1992) also found that group communication is positively related to the generation of innovative ideas. This implies that creative performance may be enhanced as others‘ views are brought into the discussion via communication within the organisation.

2.2.3.3 External communication and employee innovation

According to De Jong and Den Hartog (2005, 2010), external work contact relates to the frequency of employees‘ contact with individuals or groups outside the organisation who may form a relevant source of information, inspiration or innovation, such as contact with customers (Kanter 1988), professionals (Kimberly & Evanisko 1981) and scientists (Kasperson 1978).

The literature has emphasised the influence of external contact networks on innovation (e.g. Tidd, Bessant & Pavitt 2001). Hemlin and Olsson (2011) suggested that external contacts might stimulate innovative endeavours. De Jong and Den Hartog (2010) found that the frequency of such contacts relates to employee innovative behaviour—that is, the more external contacts at work, the better knowledge, and supervisors rated their employees on their innovative behaviour. Specifically, previous research (e.g. Damanpour 1991) has underlined the importance of customers as a source of generating new ideas. In addition, Kimberly and Evanisko (1981) found that contact with professionals outside the organisation is related to the increased adoption of innovations.

As can be seen, two issues were highlighted by the above literature review. First, there is a need for future research to examine the effect of communication on employee innovation according to different stages. As Ohly, Kase and Škerlavaj (2010) suggested, future research on idea-related communication and creativity needs to distinguish between the different stages of the innovation process. Second, researchers argued that most innovation studies underscore that individual-to-individual communication is an important factor for innovation (Carmona-Lavado, Cuevas-RodrÃguez & Cabello-Medina 2010; Poolton & Barclay 1998). However, as communication within organisations and outside organisations could have different influences on employee innovation, more research should be conducted to investigate the effect by separating internal and external communication. Thus, an extended perspective is needed to examine the influence of internal and external communication on different stages of the employee innovation process.

2.2.3.4 Communication for process innovation

Silva and Oldham (2012) pointed out that incremental innovative ideas usually represent minor refinements to existing ways of doing things, which are significantly different from radical innovations concerning major breakthroughs in the development of new products. In this respect, as Hemphälä and Magnusson (2012) showed, organisations cannot simultaneously maximise both incremental and radical innovations; they must choose between them or try to optimise, as different innovations depend on different contingencies in terms of social networks. Thus, while they suggested that social networks are a direction for future research in both cases, it is important to make distinctions between different types of innovation. The literature revealed that some studies were conducted for radical product innovation; for example, Kline and Rosenberg (1986) suggested that maintaining external contacts is inevitable to adequately produce a service and be informed about new trends and developments. However, few researchers explicitly clarified the type of innovation they examined or specified the focus on process innovation concerning minor, incremental refinements in procedures. In addition, given that general support was found for communication–employee innovation, few studies explicitly examined internal and external communication for employee process innovation separately.

More attention should be paid to the influence of facilitating employees to communicate with others on incremental idea exchange and practice. The need to identify different types of innovation in research should be highlighted, as each type might require different resources in order to affect employees.

Therefore, the current study exclusively examined the influence on employee process innovation towards refinements and increasing the efficiency of existing practices and processes in the daily work. It also examined the influence of internal communication and external communication separately.

2.2.3.5 Hypotheses development: Internal communication

Internal communication is expected to be positively associated with employee process innovation for the following reasons. Some theorists have proposed that innovation is largely a social and communicative process (Leonard & Sensiper 1998). From such a social perspective on communication for innovation, interactions with colleagues might consequently determine employees‘ behaviour and innovative performance (Hirst, Van Dick & Van Knippenberg 2009; Hirst, Van Knippenberg & Zhou 2009). Such interactions between individuals might constitute an important aspect of innovation activities, potentially influencing the emergence of ideas as well as their further refinement and implementation (Hemphälä & Magnusson 2012). As a result, employees with internal communication might be more innovative in their daily work processes.

Following Hirst, Van Dick and Van Knippenberg (2009), Hirst, Van Knippenberg and Zhou (2009), Lönsisalmi, Peiro and Kivimaki (2000) and Shalley and Perry-Smith (2008), the present study views internal communication as a continuous variable that relates to the frequency of work contacts inside organisations. In this way, internal communication implies the flow of information between employees and others within the organisation, such as work groups.

New empirical evidence is needed for the stage-by-stage effect on employee process innovation. As a result, on the basis of theoretical arguments and existing studies demonstrating links between communication and the stages of the employee innovation process towards incremental refinements in daily work processes, the following hypotheses are included.

H2a: Frequency of internal communication is positively associated with the opportunity exploration of employees.

H2b: Frequency of internal communication is positively associated with the idea generation and experimentation of employees.

H2c: Frequency of internal communication is positively associated with the idea promotion of employees.

2.2.3.6 Hypotheses development: External communication

Following Von Hippel (1988), Leppalahti and Akerblom (1991), we view external communication as a continuous variable that relates to the frequency of work contacts outside the organisation. Such work contacts refers to contacts with customers (Kanter 1988), other firms, consultants, universities and research centres (von Hippel 1988; Leppalahti & Akerblom 1991).

External communication is expected to be positively associated with employee process innovation for a number of reasons. First, it has been widely accepted that communication enables the sharing of information, which is a major source of innovation in general (e.g. Aiken & Hage 1971; Kanter 1982, 1988a; Evan & Black 1967; Tjosvold & McNeely 1988). Previous research (Lawson & Samson 2001) has showed that communication facilitates knowledge sharing by combining a wide variety of experiences, opening dialogue, building on others‘ ideas and exploring issues that are relevant to innovation. Accordingly, the extant literature (e.g. Kanter 1988; Perry-Smith & Shalley 2003) suggested that the likelihood that an employee has knowledge or can obtain knowledge of different approaches to a given problem increases if he or she has contacts with a diverse group of people at work. For example, Martin and Horne (1995) suggested that employees that have intensive contacts with their customers could use information about customers‘ experiences to improve themselves. Therefore, as it is tougher to be innovative when one is isolated or surrounded only by people from inside the organisation (De Jong & Den Hartog 2010), employees with external communication tend to be more innovative in their daily work processes.

New empirical evidence is needed for the stage-by-stage effect on employee process innovation. As a result, on the basis of theoretical arguments and existing studies that demonstrate links between communication and the stages of the employee innovation process towards incremental refinements in daily work processes, the following hypotheses are included.

H3a: Frequency of external communication is positively associated with the opportunity exploration of employees.

H3b: Frequency of external communication is positively associated with the idea generation and experimentation of employees.

H3c: Frequency of external communication is positively associated with the idea promotion of employees.

2.2.4 Reward and recognition

2.2.4.1 Introduction

Human resource management (HRM) scholars have long commented on the linkage between human resource practices and innovation (e.g. Chen & Huang 2009; Jiang, Wang & Zhao 2012). For example, Kozlowski (1987) argued that HRM could play a proactive role in facilitating innovation within a changing environment. The role of HRM has been highlighted as an effective facilitator for innovation (Wang & Zang 2005).

Previous studies suggested that if an organisation intends to be innovative, it should adopt practices that encourage its employees to act innovatively (Amabile et al. 1996). In this respect, organisations should provide an environment where employees feel motivated and committed to knowledge sharing and innovating (Velasco, Zamanillo & Del Valle 2012). Thus, it suggests that human resource practices aim to increase employee incentives to engage in innovative activities (Rammer, Czarnitzki & Spielkamp 2009; Shipton et al. 2006).

In particular, Jiang, Wang and Zhao (2012) found that when employees perceive that the organisation values them by sharing profits (incentive rewards), they reciprocate by making more effort, being more willing to provide suggestions and experimenting with new ways of doing their jobs. This implies that the reward system might play a role in motivating and encouraging employees to innovate at work.

Along these lines, in addition to the effect of the reward system on organisational innovative performances proposed by the existing work (e.g. Fan, Hong & Ruan 2011), extant literature (e.g. Shalley, Zhou & Oldham 2004) has also stressed the link between reward system–employee creativity and innovation. For example, it suggests that extrinsic incentives such as monetary compensation could motivate the innovative behaviour of employees (Winston & Baker 1985; Edwards 1989).

The following section reviews the literature relating to the effects of the reward system. This is followed by a review of the influence on process innovation in particular. Lastly, this study reviews recent studies that examined the influence on the stages of the employee innovation process.

2.2.4.2 Rewards system and employee innovation

Rewards are a central component of motivation theories (Latham & Huber 1991). According to Cabrera and Bonache (1999), organisational rewards indicate what the organisation values, and they shape employee behaviour. Reward management is a key function in HRM systems, and it plays an essential role in attracting, retaining and motivating employees (Milkovich & Newman 2005).

Specifically, organisational rewards can range from monetary rewards such as increased salary and bonuses to non-monetary recognition such as prizes (Davenport & Prusak 1998; Hargadon 1998). Similarly, rewards can also be categorised into extrinsic and intrinsic rewards. As Aldrich (1999) suggested, extrinsic rewards refers to tangible rewards that are often money-related. Intrinsic rewards refer to the feelings employees obtain from performing or mastering a task. The terms ‚monetary reward' and ‚non-monetary recognition' are used interchangeably in this study with extrinsic and intrinsic rewards, given that monetary is related to money and tangible items, and non-monetary refers to intangible items.

The effect of a reward system consisting of monetary incentives and recognition of employee creativity has been researched (e.g. Amabile et al. 1996; Eisenberger 1992). Scholars have proposed several explanations for a positive link between

reward systems and innovative behaviour by employees. They argued that such rewards encourage creativity because they have informational value and recognise employees‘ personal competencies (Eisenberger 1992; Eisenberger & Armeli 1997). Gupta and Singhal (1993) argued that financial rewards provide employees with the freedom and support, and appropriate financial rewards are essential to boost creative employees. Similarity, Jiang, Wang and Zhao (2012) suggested that rewards influence both the ability and the motivation of employees to be innovative.

Additionally, extant literature indicates that it is reasonable to assume that the influence of reward systems on stages of the employee innovation process might differ from each other. In support, Amabile (1988) suggested that monetary reward might be used to trigger the effective application behaviour of employees, as non-monetary reward is not a prerequisite for the effective implementation of innovation. Similarly, Lu and Zhang (2007) found that motivation related to an individual‘s engagement with the task positively affects employee idea generation and idea implementation, whereas motivation related to external factors such as compensation only has a positive effect on innovative idea implementation. They proposed that management should focus on the use of monetary reward and non-monetary recognition to encourage idea implementation.

As discussed, there is a research knowledge gap related to employee innovation and reward systems. Whether and how rewards contribute towards more employee innovative behaviour has not been sufficiently investigated, nor has the kind of reward been fully researched; that is, monetary reward or non-monetary recognition that employees find motivating with regard to being involved in innovative behaviour stage by stage.

In response to the above limitations, as Fernandez and Pitts (2011) suggested, future research should determine how intrinsic and extrinsic rewards could be used separately or in tandem to influence innovative behaviour. That is, one direction for future research might be to make distinctions between monetary reward and non-monetary recognition in order to study their influence on employee innovation. Additionally, as there is a possibility that the influence on

the employee innovative process might differ by stages, research is still needed to more closely examine the influence on different stages of the employee innovative process.

Therefore, this study exclusively examines the influence of monetary reward and non-monetary recognition on the employee innovation process towards incremental refinements and increasing the efficiency of existing practices and processes in the daily work. In addition, it attempts to fill the gap in the current research by studying the influences on the different stages of the employee innovation process.

2.2.4.3 Hypotheses development

Reward refers to all tangible benefits and provisions that an employee obtains as a part of his or her employment relationship (Milkovich & Newman 2005). In accordance with Gross and Friedman (2004), we view monetary reward as a continuous variable that refers to financial benefits received from the organisation, consisting of compensation (including base pay and short- and long-term incentives) and benefits (including health and insurance, retirement and work/life). Meanwhile, following Anonymous (2009), we view non-monetary recognition as a continuous variable as intangible things such as non-financial recognition, including praise, awards (Dul & Ceylan 2010) and promotion. Non-monetary recognition is believed to give an employee a certain status within an organisation (Danish & Usman 2010).

First, monetary reward is expected to be positively associated with employee process innovation for a number of reasons. Several scholars have proposed that employee behaviour is driveable and changeable, and that monetary reward can bring expected behaviour and performance (e.g. Maltzman 1960; Pryor, Haag & O‘Reilly 1969). Empirical studies provide support for the monetary reward–creativity and innovative behaviour link, and monetary reward has been viewed as necessary to motivate employee creativity (Amabile & Gryskiewicz 1989; Eisenberger, Armeli & Pretz 1998; Eisenberger, Haskins & Gambleton 1999; Eisenberger, Pierce & Cameron 1999). Rewarding divergent thinking leads to

higher levels of creativity (Winston & Baker 1985; Edwards 1989). Higher financial compensation correlates positively with increased employee innovative behaviour (Eisenberger & Cameron 1996; Eisenberger & Armeli 1997). Consequently, employees who are rewarded for their ability and courage to think differently about a problem tend to be more innovative in their daily work processes.

Second, non-monetary recognition is expected to be positively associated with employee process innovation for several reasons. Scholars have suggested that intrinsic motivations can be seen as effective instruments to improve creativity and innovative performance (Deci & Ryan 1985; Amabile 1997; Hennessey & Amabile 1998b). Recent studies have proposed that non-monetary recognition might play a role in enhancing employee creativity (e.g. Amabile 1997; Baer & Frese 2003; Martins & Terblanche 2003). In this respect, management could facilitate employee self-motivation as being beneficial for innovative behaviour by recognising them with praise (Ryan & Deci 2000), which might result in employees being more innovative in their daily work processes.

In addition, this study would take a further step to investigate the effect on stage-by-stage employee process innovation for a number of reasons. Extant literature shows that reward systems have been commonly cited as an organisational antecedent that might affect employees‘ innovative performance (Eisenberger & Cameron 1996; Janssen 2000; Mumford 2000). It is believed that efficient reward systems can be good motivators for employees‘ performance and behaviour. For example, Bowen and Ostroff (2004) suggested that a good reward system drives performance by motivating employees to achieve new levels of performance. Yusuf, Gunasekaran and Dan (2007) also found that reward and recognition are effective motivators and stimulators for desired performance. Some theorists argue that it is important to distinguish between the suggestion and implementation of ideas when considering innovation (e.g. Unsworth 1999; Unsworth & West 1998). In this respect, Axtell et al. (2000) suggested that factors might have different effects at different stages of innovation. This shows that future empirical research could examine whether reward systems that consist of monetary reward and non-monetary recognition might have differing influences

on different stages of the employee innovation process. In addition, Axtell et al. (2000) proposed that reward structures that recognise employees when they make suggestions and have them implemented are likely to help the suggestion stage of innovation.

Finally, we make a distinction between the effect of monetary reward and non-monetary recognition because, as discussed, the influences on employee innovative behaviour can motivate employees to innovate by providing incentives (e.g. Gupta & Singhal 1993) and encouraging employees to be innovative via enhancing personal feelings such as satisfaction and accomplishments (Danish & Usman 2010; Deci 1996). Extant literature suggests that such influences might differ. For example, Block and MacMillan (1993) proposed that non-financial incentives might be more important than financial incentives. Kanter (1984) also suggested that employees are most satisfied when they receive recognition from their superiors. Hafiza, Shah and Jamsheed (2011) found a positive relationship between financial reward and employee motivation, whereas non-financial rewards such as recognition, appreciation and empowerment had a weaker effect on employee motivation.

Consequently, drawing from earlier studies and intuitive thinking, this study proposes that monetary reward and non-monetary recognition are positively associated with employee process innovation. This study expects that if employees receive monetary reward and non-monetary recognition, they are more likely to develop a greater willingness to generate, practice and suggest new ideas for incremental improvements in their daily work processes. Based on the above discussion, the following hypotheses are included.

H4a: Monetary reward is positively associated with the opportunity exploration of employees.

H4b: Monetary reward is positively associated with the idea generation and experimentation of employees.

H4c: Monetary reward is positively associated with the idea promotion of employees.

H5a: Non-monetary recognition is positively associated with the opportunity exploration of employees.

H5b: Non-monetary recognition is positively associated with the idea generation and experimentation of employees.

H5c: Non-monetary recognition is positively associated with the idea promotion of employees.

2.2.5 Training

2.2.5.1 Introduction

Innovation should be viewed as a complex process that involves a set of investment possibilities. In this investment perspective, knowledge must be considered a sort of capital (Carneiro 2000). Prior work (Harari 1994; Nonaka 1994) suggested that organisations that are able to stimulate and improve the knowledge of their human capital are more prepared to face today‘s rapid changes and to innovate in the domain where they decide to invest and compete. Most innovative firms provide their staff with more training than less innovative firms (Laursen & Foss 2003; Freel 2005). Theorists have proposed a broad application of training in order to develop the employee skills and knowledge needed for innovation (Beatty & Schneier 1997; Cascio 1990; Mabey & Salaman 1995; Schuler & Jackson 1987).

In particular, as Mumford (2000) suggested, employees‘ innovative work requires the progressive acquisition of skills and expertise. In this way, training that involves providing employees with the basic knowledge and skills they need to perform their duties (Costen & Salazar 2011) is believed to be instrumental in increasing the knowledge and competence of employees (Johannessen & Olsen 2003). It can enhance employees‘ knowledge and skills, which are important to

increase innovative thought processes and provide opportunities that enhance task-domain expertise (Lau & Ngo 2004).

The following section reviews the literature in relation to the general nature of training theory for employee innovation. This is followed by a review of the literature on process innovation in particular. Finally, the study examines the influence of training according to the stages of the employee innovation process.

2.2.5.2 Training and employee innovation

Recent research shows that training is related to employee creativity. Researchers have argued that employee creativity is a function of knowledge acquisition and motivation (Lawler 1994). In this respect, extant literature suggests that one approach for organisations to enhance employee creativity and innovation is training in creative thinking techniques (Bottger & Yetton 1987; Mansfield, Busse & Krepelka 1978). Recent studies (e.g. Hennessey & Amabile 1998; Shipton et al. 2006) suggested that providing training resources and comprehensive learning opportunities might enhance employee creativity. For example, Jiang, Wang and Zhao (2012) proposed that training in divergent thinking and creative problem-solving skills would facilitate employee creativity.

In addition to enhancing creativity by improving the general creative thinking abilities of employees (Nickerson 1999; Rose & Lin 1984; Scott, Leritz & Mumford 2004), some theorists in the field of individual creativity highlighted the importance of effective features such as motivation to innovate from training (e.g. Amabile 1988; Sternberg & Lubart 1996). In this respect, training employees is believed to bring positive attitudinal improvements (Basadur, Wakabayashi & Graen 1990). The literature on organisational commitment and HR theory points out that providing training might facilitate creative positive employee attitudes and commitment (Benson, Finegold & Mohrman 2004). Nickerson (1999) argued that such attitudinal improvements would be more important than domain-specific knowledge or knowledge of creativity-enhancing techniques.

While the support for the training–employee creativity link has been provided in terms of cognitive and attitudinal improvements (Birdi 2007), and studies were conducted to examine the influence of training on idea generation (e.g. Licuanan, Dailey & Mumford 2007), other researchers took a broader perspective by focusing on the influence on the idea implementation stage of innovation. For example, training is believed to expose employees to a broader palette of ideas that can be brought to bear on problems requiring novel solutions (Damanpour 1991; Thompson 1965; Fernandez & Pitts 2011; Katz & Tushman 1981). Similarity, as Basadur (2004) suggested, while training has been shown to make people more willing to actively diverge to generate more and better ideas for solving problems, it also improves skills in evaluating ideas and improves the ability to separate idea generation from evaluation through deferral of judgment.

However, it is worth noting that, as Birdi (2007) suggested, the issue of the differing influence of training on idea generation versus idea implementation requires future exploration. Given that it is possible that training might be limited to mainly facilitating employees to generate ideas, whether those ideas are put into practice might be more relevant to other factors that are not under the influence of employees (Van de Ven, Angle & Poole 1989). Birdi (2007) argued that there is little empirical evaluation of training for the management of innovation. This implies that a more comprehensive perspective is needed to investigate the influence of training on different stages of the employee innovation process.

2.2.5.3 Training and process innovation

Carneiro (2000) proposed that knowledge development is a fruitful background where incremental innovation might be attempted. Similarly, Schmierl and Köhler (2005) suggested that training is especially important in a non-R&D intensive environment because daily work requires hybrid qualifications that are not usually offered by the market. This implies that training might play a role in influencing employee innovative behaviour towards incremental innovation concerning daily work processes. In support, Beugelsdijk (2008) suggested that training is positively associated with incremental innovation.

However, it finds that few researchers explicitly specify the focus on process innovation towards incremental improvements in everyday working processes. Most studies are limited to knowledge employees, such as in R&D functions (e.g. Wang & Horng 2002), and address radical innovation in products (e.g. O'Connor, Paulson & DeMartino 2008).

Consequently, in accordance with previous studies (e.g. Birdi 2007) and taking a further step, the present study exclusively examines the effect of training on the employee innovation process towards incremental improvements in daily work processes from idea generation to putting them into practice.

2.2.5.4 Hypotheses development

Training is used to provide employees with the knowledge and skills needed for their present job (Fitzgerald 1992). This study expects training to be positively associated with employee process innovation for several reasons. Several theorists have suggested that the nature of training appears to be compatible with employee innovative behaviour because the focus of training courses tends to be on generating and choosing solutions using creative thinking techniques as well as opportunity- or problem-finding and the implementation of ideas (Basadur, Graen & Green 1982; Leavitt 1975; Wang & Horng 2002). Previous research (Shalley & Gilson 2004) revealed that employees try to be more innovative in their work if they are offered training opportunities that can increase their knowledge base or creativity-relevant skills. This implies that by offering training opportunities, employees' work might benefit from an increased knowledge base and skills. In addition, by offering training opportunities, employee motivation to innovate at work is enhanced (e.g. Basadur, Graen & Green 1982). Therefore, employees tend to be more innovative in their day-to-day work processes.

In addition, this study would more closely examine the influence on stage-by-stage employee process innovation for a number of reasons. Following Amabile (1988), innovation is considered to not only cover the generation of ideas that are novel and useful to the workplace, but also to include their implementation in ways of working. In this respect, Birdi (2007) suggested that the skills needed for

idea generation are likely to be different to those required for idea implementation (e.g. planning). This implies that future research could examine whether the effect of training on the employee innovation process differs between different stages. This research direction is consistent with the theoretical view that factors that influence the generation of ideas differs from those that influence their implementation (Axtell et al. 2000). This perspective can also be informed by findings from the general training literature, which shows that the application of trained skills at work is influenced by external factors such as the opportunity to use skills and the degree of social support (Tannenbaum & Yukl 1992; Warr, Allan & Birdi 1999). Consequently, another aim of this study is to investigate the influence on everyday innovation with respect to different stages. Birdi (2007) found that creativity training is only slightly more strongly related to the generation of ideas as opposed to their implementation.

Given that empirical studies that explicitly examined the effect of training on the process innovation type at the employee level are still scarce, based on the theoretical arguments and previous studies that demonstrate the link between training and employee creativity and innovation, the present study includes the following hypotheses.

H6a: Training is positively associated with the opportunity exploration of employees.

H6b: Training is positively associated with the idea generation and experimentation of employees.

H6c: Training is positively associated with the idea promotion of employees.

2.3 Chapter summary

This chapter has presented a review of the literature relevant to developing a theoretical framework for understanding the relationships between employee innovation and six organisation-related factors. The proposed framework

emphasises stages of employee innovation concerning incremental improvements of processes—that is, from idea generation and idea implementation to idea promotion at the employee level—as the key aspects for examining the influences of corporate-level factors on those stages. While the current body of research regarding the influences of the six corporate-level factors on employee innovative behaviour has been well identified, the current literature has paid little attention to their influences on the stages of employee innovative behaviour towards process innovation, thereby leaving the door open for future investigation.

Chapter 3: Research Methodology

This chapter presents the methodology for the research. It begins with a description and justification of the chosen method. This is followed by a discussion of the instrument development, pre-test, sampling method, data collection and data analysis techniques. The quality of the data is also discussed in this chapter. Finally, the chapter concludes with a summary.

3.1 Research methodology

When designing the research method, the nature of the research questions and objective of the study should be considered because particular research methodologies are more suited to particular research problems (Babbie 2005). This study attempted to expand the understanding of the links between corporate-related factors and employee innovation by emphasising the importance of employee innovative behaviour on incremental innovation (e.g. Axtell et al. 2000; Scott & Bruce 1994), which relates more to minor changes/modifications in daily work processes. Therefore, this research is theory extension rather than theory generation. It follows a hypothetical–deductive approach (Burrell & Morgan 1979; Deshpande 1983), where deductive refers to research that starts with a hypothesis and designs a study to systematically test them (Carpiano & Daley 2006).

Due to the theory extension nature of this study, a positivist approach is deemed appropriate (Burrell & Morgan 1979; Deshpande 1983). A positivist approach relies on a reductionist view in its search for universal mechanistic rules that are not contextually bounded, and it seeks to verify hypotheses (Phillips & Burbules 2000). That is, positivism is associated with deductive theory testing (Burrell & Morgan 1979; Deshpande 1983), which is an approach that researchers use to reach generalisable conclusions (Creswell 1994; Deshpande 1983). Using the deductive method, the researcher begins with hypotheses development and follows with observations that are relevant to testing the hypotheses. Finally, the

researcher decides whether to accept or reject the hypotheses by comparing the observations and hypotheses (Babbie 2005).

Accordingly, a quantitative research methodology was employed because it relies on numerical data to test hypotheses. The quantitative methodology involves data collection and the analysis of numerical data (Hesse-Biber & Leavy 2006; Veal & Ticehurst 2005). Quantitative research allows for the collection of answers to a number of questions from a large sample of the population. It allows the researcher to collect and explore information that describes the experience being studied, and it helps prevent bias in collecting and presenting data; for example, a questionnaire survey might avoid interview bias and assure anonymity (Neuman 2003; Sarantakos 2005); therefore, quantitative research could avoid subjectivity (Sarantakos 2005).

A questionnaire survey was the most appropriate way to obtain the necessary data for the present study to test the proposed hypotheses. It is evident that a survey questionnaire, when constructed and used properly, is a powerful scientific instrument for collecting data (Borg & Gall 1989; Shaughnessy & Zechmeister 1997). A survey provides an opportunity to contact a large audience with moderate cost in time and money (Van Riel et al. 1998). Similarly, Babbie (2005) suggested that surveys—especially self-administered ones—could make large samples feasible. A questionnaire is a powerful scientific instrument for measuring different variables (Shaugnessy & Zechmeister 1997). In addition, surveys are flexible because they allow researchers to ask many questions on a given topic, thus giving them considerable flexibility in the analysis (Babbie 2005).

In particular, a self-administered questionnaire could provide greater accessibility to a relatively large number of participants in a wide geographic area (Neuman 2003; Hoyle, Harris & Judd 2002). The use of a structured, self-rated questionnaire can help to obtain perceptual data collected confidentially and inexpensively (Shaughnessy et al. 2000). Moreover, according to Shaughnessy et al. (2000), survey research can be used to measure the nature of people‘s thoughts, opinions and feelings. As this thesis is interested in the personal behaviour of employees and the influences of organisation-related factors from the employee‘s

perspective, a self-administered survey was employed in this study. The researcher chose to survey individuals about their own innovative behaviour because this behaviour could be unknown to the supervisors or other colleagues. In addition, their innovative behaviour could be considered threatening by supervisors and colleagues (Thornberry 2003). Therefore, it could be hard to obtain true views about employees‘ innovative behaviour from others‘ evaluations.

Therefore, the researcher collected data using a self-administered questionnaire survey conducted in China within a period of five months between November 2010 and March 2011. The detailed research plan is presented in the following sections.

3.2 Sampling

The sampling method is part of the research plan that indicates how cases are selected for investigation (Singleton & Straits 1999). Sampling methods can be classified as either probability sampling or non-probability sampling (Singleton & Straits 1999). According to Trzesniewski, Donnellan and Robins (2008), convenience sampling means that data are not sampled randomly from the general population. Zikmund (2003) referred to convenience sampling as the process of obtaining information about people who are the most conveniently available. Convenience sampling was used in this study for several reasons. First, in this study, anyone employed in an organisation could participate (i.e. the population of the present study). This qualification would ensure that participants understand the workplace within their organisations, making the survey items easy for them to accomplish. In addition, this qualification would not introduce sampling bias or errors. Given this, as the population is quite large in this study, it is extremely difficult to identify every employee of an organisation, and it is also not necessary for this study to do so.

Specifically, 1,850 questionnaires were sent over a five-month period in China. After checking all returned questionnaires, a final usable sample size of 1,299 was obtained. According to Hair et al. (1998), the sample size suitable for most

multivariate analysis approaches should have a minimum ratio of at least five respondents for each estimate item. The present study has 42 variables (excluding variables for demographic characteristics). Therefore, given the final sample size of 1,299, the researcher obtained the ratio of 30 respondents for each item, which was found to be above the minimum sample size for analyses, as the extant literature suggested (Hair et al. 1998).

3.3 Survey instrument

The survey instrument consisted of an information sheet and the survey questionnaire, as illustrated in Appendix A (English Questionnaire) and Appendix B (Chinese Questionnaire). The information sheet describes the purpose of the study, the structure of the questionnaire and other relevant information such as why the participant had been invited, voluntary participation and confidentiality for the potential participants. Below are descriptions of the scales included in the survey instrument.

The questionnaire consisted of five sections. Section 1 aimed to gather background information about the respondents and the organisations. Section 2 was designed to collect respondents‘ perceptions about their innovative behaviour in the workplace. Section 3 focused on respondents‘ views about their relationship with their supervisor. Sections 4 and 5 focused on collecting data that showed the condition of internal and external communication at work. Sections 6 and 7 focused on respondents‘ perceptions about monetary reward and non-monetary recognition that organisations provide. Section 8 aimed to gather data relating to respondents‘ perceptions about available training.

The survey used measures that were developed based on insights from the extant literature from both published questionnaire items (for measuring employee innovative behaviour and the quality of the supervisor–employee relationship) and the extant literature providing theoretical definitions and domains of the other constructs of interest (for measuring internal and external communication, monetary reward, non-monetary recognition and training).

All items were worded positively in the questionnaire. Respondents were asked to rate the items for each construct on a seven-point Likert scale. The following discussion is framed in relation to each construct of interest for the present study.

3.3.1 Employees' innovative behaviour

The present study used the instrument proposed by Kleysen and Street (2001) to measure employee innovative behaviour. Sixteen items were used based on the work of Kleysen and Street (2001) to assess the three stages (opportunity exploration, idea generation and experimenting, and idea promotion) of employee behaviour in process innovations. Items were scored on a seven-point Likert scale that ranged from ‗1=never' to ‗7=always'. Among the 16 items, employees provided self-rated assessments on three items for opportunities exploration (i.e. ‗In your current work, how often do you recognise opportunities to make a positive difference in your work?'); eight items for generating and experimenting ideas (i.e. ‗In your current work, how often do you experiment with new ideas?'); and five items for idea suggestion (promotion) (i.e. ‗In your current work, how often do you put ideas forward to supervisor-level people so they have a chance to become implemented at the corporate level?').

Three original items were reworded to fit better with this study's situation and to make it easier for participants to understand. As this study focused on process innovation, the researchers reworded the original item ‗improve an existing process, technology, product, service or work relationships' to ‗improve an existing process' (see item 11 of questionnaire). The original item ‗take the risks to support new ideas' was broadened into three items: ‗take the risks to support other colleagues' new ideas' and ‗take the risks to promote own new ideas' to ensure that the construct's domain was adequately covered (see items 25–26). The researchers separated the original item ‗push ideas forward so that they have a chance to become implemented' into two items to distinguish two levels (i.e. peer level and supervisor level) for where to push ideas forward as ‗push ideas forward to the colleagues' and ‗push ideas forward to supervisor-level people'.

In this study, all 16 measurement items were arranged in a logical flow; that is, from idea generation to implementation, followed by suggestion and promotion, which is different from the original sequence. By doing so, the measures are presented in the order consistent with the conceptualisation of employee process innovation in this study. This helped participants to evaluate their behaviour more easily.

3.3.2 Quality of the supervisor–employee relationship

The quality of the supervisor–employee relationship was assessed by a slightly modified version of the seven-item LMX instrument proposed by Graen and Uhl-Bien (1995). LMX-seven is concise and measures three dimensions of leader–member working relationships—respect, trust and obligation—and it is an extensively pre-tested instrument that has proven to be valid and reliable (Graen & Uhi-Bien 1995).

In this study, the researcher used the same items proposed by Graen and Uhi-Bien (1995) but worded affirmatively (i.e. original items were adapted from questions such as ‗Do you know where you stand with you leader' into statements such as ‗You know where you stand with your supervisor'). Using a seven-point scale, respondents rated the extent of their agreement with statements about the quality of their relationship with their supervisors. The scale ranges from ‗1=totally disagree' to ‗7=totally agree'. Among the seven items, the researchers separated one original item into two to ensure that each item only included one (items 28–29 of questionnaire). Therefore, an eight-item scale based on LMX-seven was used to measure this construct (see Appendix A).

3.3.3 Internal communication at work

This variable was measured with four items that were based on the extant literature, which provides theoretical definitions and domains of this construct (see Appendix A). These four items (item 39–42) asked respondents to rate their frequency of communication at work with employees from the same and different work areas with the same and different job tasks. Participants responded to these

four items using a seven-point Likert-type scale ranging from ‗1=not at all' to ‗7=yearly'.

3.3.4 External communication at work[1]

This variable was measured with four items that were derived from the existing literature (Von Hippel 1988; Leppalahti & Akerblom 1991) (see Appendix B). These four items asked respondents to rate their frequency of external contacts at work, including with conferences, customers, other companies and institutions. Participants responded to these four items using a seven-point Likert-type scale ranging from ‗1=not at all' to ‗7=yearly'.

3.3.5 Monetary reward

As there is no existing scale for this construct of interest for this study, this variable was measured with four items that were generated for the purpose of this study (i.e. ‗How often do you receive the following rewards: increased wages; bonuses; various allowances; social wage?'). Participants responded to these five items using a seven-point Likert-type scale ranging from ‗1= never' to ‗7= always'.

3.3.6 Non-monetary recognition

Based on the current literature (e.g. Bartol 2002; Danish & Usman 2010), the quality of non-monetary recognition is defined as an employee's self-rating of views on which he or she thinks about non-monetary recognition in terms of the ‗promotion', ‗honour', ‗symbolic support' that he or she can receive from the current organisation.

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[1] There were 35 participants who did not use any external communication mechanisms, and that this represents such small proportion of the sample (1,299 in total) that it does not affect the results or conclusions.

As there is no existing scale for this construct of interest for this study, this variable was measured with three items that were generated for the purpose of this study (i.e. ‗How often do you receive the following recognition: promotion; honour; symbolic support?'). Participants responded to these five items using a seven-point Likert-type scale ranging from ‗1=never' to ‗7=always'.

3.3.7 Training

Using a seven-point scale, participants rated the extent of their agreement with statements about the quality of training at work ranging from ‗1=totally disagree' to ‗7=totally agree'.

3.3.8 Control variables

The demographic characteristics were ascertained for each participant with direct and straightforward questions included on the questionnaire in the first section. The researcher collected the demographic data such as gender, age and education level because the researcher planned to check for differences in the employee innovative behaviour to socio-demographic variables. As such, it is expected to gain in-depth understanding based on the collected data. By collecting information on important demographic characteristics, the survey sample in the present study can be accurately described.

The control variables fall into two different categories. The first category consists of the demographic characteristics of the respondent, including gender and education. The second category includes measures of the organisation size and job characteristics.

The current study used gender (1=female, 2=male) and the level of education (1=below undergraduate, 2=undergraduate and above) as control variables to check for differences in employee innovative behaviour related to socio-demographic variables. Kanter (1984) suggested that under certain circumstances women would behave more innovatively than men. Pinchot (1985) claimed that educational level could affect innovative behaviour by employees. Moreover, the

educational level of an employee has been suggested to be important to innovation (Mumford & Gustafson 1988; Tierney & Farmer 2002), and it might affect the ability of an employee to identify and generate new ideas.

In addition, Pinchot (1985) suggested that work experience from technical-oriented work would improve the likelihood of innovative behaviour by employees. Moreover, innovative behaviour by employees may be more common among employees who hold jobs in certain functional areas (Pinchot 1985). Therefore, because work area might influence employee innovative behaviour, work area (1=specialised technical relevant, 2=less specialised functional) was included as a control. Further, according to Pinchot (1985), job rotation will improve the innovative behaviour of the employees. Lee and Wong (2004) also argued that organisational tenure is positively related to innovation behaviour. Thus, the length of service time (1= <= five years, 2= >five years) was included as a control. Finally, according to Kanter (1984), large organisations offer more opportunities for learning experiences, which could be implemented in another functional or technical arena. Thus, organisation size (1=medium and small, 2=large) was also used as a control variable.

3.4 Common method variance (CMV)

In typical survey studies in which the same rater responds to the items in a single questionnaire at the same point in time, data are likely to be susceptible to CMV (Kemery & Dunlap 1986; Lindell & Whitney 2001). As described by Fiske (1982), CMV refers to the variance that is attributable to the measurement method rather than to the constructs that the measures represent. Such a variance may occur as a result of factors such as social desirability, the halo effect and selective memory brought about by the self-reporting method, and it can threaten the internal validity of conclusions about the predictive relationships between measures (Campbell & Fiske 1959; Howard 1994; Spector 1994; Podsakoff et al. 2003). Using a single source to measure variables—usually self-rated surveys—may inflate correlations among variables. As suggested by Kaynak (1997), a researcher should therefore plan how to overcome CMV.

In this study, as all data were self-rated and collected through the same questionnaire during the same period with cross-sectional research design, CMV that is attributed to the measurement method rather than the constructs of interest may cause systematic measurement error and thus further bias the estimates of the true relationship among theoretical constructs (Avolio, Yammarino & Bass 1991; Podsakoff et al. 2003). Therefore, CMV may cause concern. The present study thereby utilised other techniques that could be helpful in controlling for CMV, as suggested by Podsakoff et al. (2003). The assessment of CMV is presented in this section.

Harman‘s Single Factor test (Podsakoff et al. 2003) was performed to examine whether CMV was a problem in the current study. This statistical method is one of the most widely used techniques to address the issue of CMV (Podsakoff & Organ 1986; Podsakoff et al. 2003). Researchers using this technique traditionally load all variables in their research into an exploratory factor analysis (EFA) and examine the unrotated factor solution to determine the number of factors that are necessary to account for variance in the variables (e.g. Andersson & Bateman 1997; Aulakh & Gencturk 2000; Organ & Greene 1981; Schriesheim 1979). If a substantial amount of CMV is presented, either a single factor will emerge from the factor analysis or one general factor will account for the majority of the covariance among the variables (e.g. Anderson & Bateman 1997; Aulakh & Gencturk 2000; Podsakoff et al. 2003).

The present study used Harman‘s one-factor test (Schriesheim 1979) to address the common method bias issue. A principal components factor analysis on items in the nine variable measures was performed to examine if common method bias was a serious problem in this study. The factor analysis extracted nine factors with an eigenvalue greater than 1.0 (together accounting for 71.61% of the total variance), and the first (largest) factor accounted for only 15.92% of the variance. The results of this test indicate that CMV was not a problem in this study. Not a single factor, nor one general factor, emerged from the factor analysis to account for most of the covariance in the dependent and independent variables (Podsakoff & Organ 1986); thus, it is unlikely to confound the interpretations of results.

3.5 Reliability and validity

It must be noted that a central issue in research using survey questionnaires is internal reliability, referring to the extent to which all items within one scale capture the same construct (Hair et al. 1998). A common indicator of internal reliability is the Cronbach‘s alpha coefficient (α), which ideally should be greater than 0.70 to show an acceptable internal reliability level (Nunally & Bernstein 1994; Pallant 2007). The higher the value of Cronbach‘s alpha coefficient (α), the higher the internal consistency of the item measurement of each construct, thus a high internal reliability of the survey instrument (Hair et al. 1998). Table 3.1 outlines the Cronbach‘s alpha coefficient (α) values for each construct in this study. The results suggest that the reliability of measures in this study is satisfactory (alphas from .701 to .933).

Table 3.1: Summary of results of Cronbach’s alpha test

Construct	Cronbach‘s alpha
Opportunities exploration	0.721
Generating and experimenting ideas	0.933
Idea promotion	0.886
Quality of the supervisor–employee relationship	0.869
Internal communication	0.842
External communication	0.701
Monetary reward	0.811
Non-monetary recognition	0.827
Training	0.920

Validity refers to the extent to which a measurement procedure truly measures what it is intended to measure (Peter 1979; O‘Leary 2004). The present study employed construct validity checks for the measurement items, which is used to examine the extent to which a scale measures a theoretical variable of interest (Woo Bock & Kim 2002). In particular, construct validity is established by convergent validity and discriminate validity (Straub 1989; Chi 2005), convergent validity is concerned with the extent to which multiple attempts to measure the same concept with different methods are in agreement, and discriminate validity is

the extent to which a concept differs from other concepts (Fornell & Larcker 1981; Hair et al. 1998).

Correlations between the latent constructs in factor analyses can be checked to establish convergent and discriminate validity (Hair et al. 1998). In this study, EFA, which concerns relationships among variables, was used to test the convergent validity of measurement scales (Hair et al. 1998). Specifically, the researcher evaluated the item-to-total correlation; that is, the correlation of each item to the sum of the remaining items. The scores for each single item within an instrument may be correlated with scores on the total test (Gregory 1996). The rationale for this check is that an instrument with a high level of internal consistency would consist of items that are reasonably homogeneous and that demonstrate high item–total correlations. Everitt (2002) and Field (2005) suggested that a correlation value of less than .20 or .30 indicates that the corresponding item does not correlate very well with the scale overall, and it may be dropped.

The researcher also assessed the mean inter-item correlation. A small item correlation provides empirical evidence that the item is not measuring the same construct by the other items included. In this study, the item–total correlation test was performed to check if any item in the sets was inconsistent with the average behaviour of the others. The recommended critical values are .30 for the mean inter-item correlation and .20 for any item-total correlation (Cortina 1993; Nunnally 1967). Table 3.2 shows the results of the convergent validity test, which suggest that no mean inter-item correlations in this study were lower than .30 and no item-to-total correlations were lower than .20, indicating that they achieved the acceptable level for the assessment of convergent validity.

Table 3.2: Summary of results of validity test

Construct	Mean inter-item correlation	Range item–total correlations
Opportunities exploration	0.472	0.451–0.610
Generating and experimenting ideas	0.634	0.669–0.820
Idea promotion	0.605	0.588–0.807
Quality of the supervisor–employee relationship	0.456	0.480–0.751
Internal communication	0.584	0.605–0.783
External communication	0.373	0.381–0.586
Monetary reward	0.533	0.571–0.715
Non-monetary recognition	0.613	0.579–0.776
Training	0.748	0.766–0.889

Discriminate validity was assessed using the factor loading values. The validity was supported by the Principal Component Analysis (PCA), in which the value of the factor loading of each item into its relative principal component should not be less than .40 (Straub, Boudreau & Gefen 2004). The results of the PCA indicate that all of the loadings were above .50, which means that the acceptable level of standardised loading estimates for the assessment of validity was achieved. Detailed results computed via PCA are presented in Chapter 4. Moreover, following Kline (2005), correlations between constructs should not exceed .85 in order for the constructs to have discriminate validity. The correlation results reveal that correlations between constructs in this study were below .85. In summary, the reliability and validity of the variables were found to be acceptable.

3.6 Pre-test

According to the current literature (Davis & Cosenza 1985; van der Velde, Jansen & Anderson 2004), once a survey instrument is completed in draft form, it should be subject to a pre-test in order to ensure readability and detect any potential ambiguity regarding the wording and format of survey items. This procedure is expected to help researchers to minimise errors due to unclear wording or improper design (Schwab 2005; Zikmund 2003). Therefore, before collecting data, the questionnaire was pre-tested in order to discover ambiguous questions. The basic goals of the pre-test conducted for the current research include evaluating

the competency of the questionnaire and estimating the length of the survey (Larossi 2006).

The researcher asked two academics in the School of Management of the University of Tasmania to screen the questionnaire for problems with question wording and bias due to the question sequence. Based on their feedback, minor changes to the wording of a few questions were made to ensure that the questionnaire was easy to understand. The questionnaire was then pre-tested on 10 employees from different work functional areas in the service industry in the cities of Tai‘an and Shanghai, China, to ensure that the questions were clear (their responses were not used in the final study). Feedback from the pre-test showed that the questions were clearly and easily understood and that there was no need to further revise the questionnaire. The format was logical and clear, and the questionnaire could be completed within 15 minutes, which is a suitable time limit.

3.7 Ethical considerations

This study was conducted with the approval of the University of Tasmania‘s Human Ethics Research Committee (approval number: H11495). To fulfil the considerations of ethical approval, the questionnaire included an information sheet to invite voluntary participation, to explain the purpose of the study, and to address issues relating to anonymity and confidentiality. This ensured that respondents knew that all answers to questions in this questionnaire would remain anonymous and all information would be treated confidentially; there were no right or wrong answers. It also advised them how to complete and return the survey.

3.8 Language for the survey

As the current research was conducted in a Chinese-speaking context, the questionnaire was translated from English into simplified Chinese following back-translation procedures (note that simplified Chinese and traditional Chinese are different variations of the written Chinese language, where simplified Chinese is

the official writing system in mainland China). This procedure has been used to adapt a large number of English measures into other languages (Mallinckrodt & Wang 2004), which can improve the research‘s validity in different languages (Sartorius & Kuyken 1994; Sekaran 2003). The researcher, a native Chinese speaker, first designed the survey questions in English and then translated the survey from English to simplified Chinese. Following that, the Chinese version of the questionnaire was then translated back into English by a Chinese bilingual person with a Ph.D. Finally, the original and back-translated items were compared to see if differences in meaning existed. No differences in meanings were found between the original version and the back-translated version. Therefore, the simplified Chinese version of the questionnaire was used in the survey.

3.9 Data collection

As presented earlier, data for this thesis were gathered through a questionnaire survey conducted in China. The detailed data gathering procedure is presented in this section. The researcher followed a two-step procedure.

Using relationship networks, the researcher initially contacted existing contacts from a variety of organisations in China to solicit their participation in this research. The researcher then passed on hard copies of the Chinese (simplified) version of the questionnaire to the contacts, who then physically distributed hard copies of the questionnaire to their contacts in a range of organisations.

Next, the questionnaire was distributed to employees through the contacts. All participants were informed in the information sheet that participation was voluntary. They were told that their individual responses would remain confidential and that the data would only be used for statistics. They were informed that their consent to participate in this study would be implied by the return of the completed questionnaire through the contacts that distributed the questionnaire. They were informed that if they wished to be involved in this study, they needed to complete the questionnaire, place it into the envelope provided and return it to the person in charge of distributing and collecting the questionnaires.

Then all received envelops from employees would be placed into one envelop provided for the distributor and then returned to the researcher. This provided an opportunity to discuss with some of the contacts how the process of distribution had been completed. Additionally, informal feedback was also obtained on how the respondents had reacted. No significant problems were reported.

3.10 Sample profile

Frequency tables were generated to provide descriptive statistics about the profile of the sample in the present study. To understand the characteristics of each construct, descriptive statistical analysis was employed to illustrate frequencies, means and standard deviations of every construct.

The results of descriptive statistics for demographic information collected from the respondents are presented in this section, including gender, highest education level, the work area of the participant, the length of time the participant has been employed in the current organisation, the industry of the participant‘s organisation, the ownership type of the participant‘s organisation, the number of employees in the participant‘s organisation and the organisation‘s years of operation. They were conducted to provide simple summaries about the sample and the measures for this thesis.

Of the 1,299 completed questionnaires, 42.1% were male and 57.9% were female. The age of the participants ranged from 18 to 55. Most of the participants (61.4%) had bachelor degrees (61.4%), very few completed high school and below (1.2%) and 6.9% had a Master‘s degree or above. The participants were spread across nine different work areas, including 23.7% in sales, 20.9% in general administration, 12.4% in technical areas, 11.5% in advertising and marketing, 8.9% in human resources, 7.2% in finance and accounting, 7.0% in R&D, 6.1% in production and operation, and the remainder (2.4%) in ‗other‘ work areas. Regarding the respondents‘ length of service in years, the majority of the respondents had 1–3 years‘ service in their current organisation (40.3%). Only 1.8% had 10–20 years‘ service and 8.6% had less than three months‘ service.

In regards to the industrial classification of organisations, the majority of participating organisations were from the services industry (62.1%). The other three industries included infrastructure (19.3%), manufacturing (14.6%) and energy (3.8%). In addition, the ownership types of organisations included in the sample were Limited Liability Corporation (32.9%), state-owned enterprise (27.6%), private enterprise (20.6%), Sino-foreign cooperative enterprise (8.2%), wholly foreign or Hong Kong (HK), Taiwan or Macao-owned enterprise (7.6%), Sino-foreign or HK, Taiwan or Macao equity joint venture (2.6%) and collective-owned enterprise (.3%).

About 43.6% of the organisations had fewer than 100 employees, while 38.1% had between 101 and 499 employees. About 10.3% of the organisations possessed between 501 and 1,000 employees, and 7.9% possessed >=1001 employees. Moreover, regarding the years that the participating organisation had operated for, about 32.8% of the participating organisations had been in business for 1–5 years. Of the organisations participating, 28.1% had between six and 10 years in business, 18.8% had between 11 and 20 years in business, 18.2% had been in business for more than 20 years, and 2.1% had been in business for less than one year.

The results of the descriptive statistics above provide the demographic characteristics of respondents, showing the diversity of the participants‘ profiles in this study to have a better understanding of their responses and resulting conclusions for the research.

3.11 Correlation analysis

In order to test the 18 hypotheses for this study, the inferential tests used include the Pearson Product–Moment Correlation Coefficient, Multiple Regression Analysis. The upper level of statistical significance for null hypothesis testing was set at 5%, which is the most widely used level of significance (Hair et al. 1998).

All statistical test results were computed at the two-tailed level of significance in accordance with the non-directional hypotheses presented (Sekaran 2001).

The Statistical Package for the Social Sciences (SPSS) Version 18 was used to store and analyse the data. The SPSS was sufficient for the types of tests that were used.

First, as preliminary analysis, principle component analysis with Varimax rotation was performed. PCA could be used to concisely describe and understand the relationships among observed variables (Tabachnick & Fidell 2001) and to explain these variables in terms of their common underlying dimensions (Hair et al. 1998). The Varimax method—an orthogonal rotation method—was used because it is the most widely used rotation for factor loadings (Norusis 1993) regarding its ability to secure a simple structure effectively.

Correlation coefficients indicate both the direction of the relationship and its magnitude (Hameed & Amjad 2011). The Pearson Product–Moment Correlation Coefficient is a statistic that indicates the degree to which variables are related to one another (Hair et al. 1998). The sign of a correlation coefficient (+ or -) shows the direction of the relationship between -1.00 and +1.00. A positive correlation indicates a direct and positive association between two variables (Leary 2004). As the present study aimed to investigate the relationship between the dependent and independent variables, the Pearson Product–Moment Correlation Coefficient was appropriate for hypotheses testing. It was used to test whether the independent variables (quality of the supervisor–employee relationship, frequency of internal communication, frequency of external communication, quality of monetary reward, quality of non-monetary recognition and quality of training) were positively associated with the three dependent variables (opportunity exploration, idea generating and experimenting, and idea promoting of employee process innovative behaviour), respectively. The correlation analysis was employed here to test whether the variables were reliable, and the Pearson Product–Moment Correlation Coefficient r was examined to indicate the strength of the relationship between the independent variable and dependent variable (Hair et al. 1998).

3.12 Multiple regressions

Multiple regressions are employed for hypothesis testing. Given that the correlation coefficient *r* does not give the magnitude of the variance in that dependent variable that will be explained when several independent variables are theorised to simultaneously affect it (Im 2003), it is worth noting that the dependent variable, for example opportunity exploration, may be explained by a range of independent demographic and other variables. Thereby, multiple regressions are excellent tools to evaluate the relationship between a set of independent variables and a dependent variable (Tabachnick & Fidell 2001). Hair et al. (1998) suggested that multiple regression analysis can be used to analyse the relationship between a single dependent variable and several independent variables.

As the current thesis was interested in the relationship between the dependent variables (opportunity exploration, idea generating and experimenting, and idea promoting of employee process innovative behaviour) and the independent variables (quality of the supervisor–employee relationship, frequency of internal communication, frequency of external communication, quality of monetary reward, quality of non-monetary recognition and quality of training), multiple regressions were appropriate. Specifically, the adjusted R^2 in the multiple regressions shows how much of the variance in the behaviour is explained by the independent variables. The standardised beta values in multiple regressions indicate the relative strength and direction of the independent variables on the examined behaviour (Åmo & Kolvereid 2005; Hair et al. 1998).

In this study, in order to test if the demographic variables including gender, education level, work area, organisation size and work length affected the variables of interest, a hierarchical regression was employed to examine the relationship between a set of independent variables and the dependent variables, after controlling for, or taking into account, the influence of the control variables on the dependent variable.

First, for each of the dependent variables, including opportunity exploration, idea generating and experimenting, and idea promoting, a regression with only control variables was run, including measures describing the individual and organisation. By doing so, the researcher aimed to investigate the influence of the control variables on the relationships proposed between employee process innovative behaviour and corporate factors. The regression then included the measures of corporate-level factors in addition to the control variables, which was run for each dependent variable. Specifically, the regression, controlling for gender, education level, service length, work area and organisation size, was conducted with the six corporate-level factors as the predictors and opportunity exploration, idea generating and experimenting, and idea promoting as the criterion, respectively.

3.13 Chapter summary

This chapter presented the methods used for the analyses, of which the rationale is also provided. A quantitative methodology was deemed suitable for investigating the influences of corporate-level factors on employee process innovation at work. This chapter addressed all major aspects of the research design, measuring instruments, sampling method, data collection and statistical methods that were employed to analyse the data.

Chapter 4: Analysis and Results

This chapter presents the results of the data analysis and hypothesis testing. First, results from the factor analysis are presented. This is followed by the inferential statistical analysis, including correlation and multiple regression analyses for hypotheses testing. The chapter concludes with a summary.

4.1 Principal component analysis

In this study, all observable variables were entered into a factor analysis using PCA with Varimax rotation to determine the number of factors that are necessary to account for the variance in the variables. It was conducted to extract the anticipated factors regarding the employee innovation process and organisational factors. Generally, the components of a construct are considered the principal components if it has an eigenvalue greater than 1.0 and is used for further analysis (Straub, Boudreau & Gefen 2004). Factor loadings were also checked in order to examine how each item loaded into its corresponding factor (Hair et al. 1998). The value of factor loading of each item into its relative principal component should not be less .40 (Straub, Boudreau & Gefen 2004).

Before the extraction process, as indicated in Table 4.1, the Kaiser–Meyer–Olkin (KMO) values ranged from .646 to .930, which were greater than the acceptable level of .50 suggested by Kaiser (1974), supporting the adequacy of the sample for factorisability. The Bartlett‘s test of sphericity was highly significant, which indicated that the correlation matrix was not an identity, supporting the factor analysis (Stewart 1981).

Table 4.1: KMO and Bartlett's Test

Constructs	KMO Measure of Sampling Adequacy	Bartlett's Test of Sphericity Chi-square	Bartlett's Test of Sphericity Sig.
All items of the constructs	.857	40077.668	.000
Opportunity exploration stage	.646	869.99	.000
Generating and experimenting ideas stage	.930	7469.95	.000
Promoting ideas stage	.812	3859.78	.000
Quality of the supervisor–employee relationship	.816	5201.96	.000
Internal communication	.717	2632.16	.000
External communication	.730	933.04	.000
Monetary reward	.747	1974.50	.000
Non-monetary recognition	.670	1639.12	.000
Training	.779	4474.62	.000

The results reveal the presence of nine distinct factors with eigenvalues greater than 1.0. The values of loadings of all items in this study vary from .542 to .903. Based on the nature of the variables, the nine factors extracted were accordingly termed as ‗Generating and experimenting ideas stage', ‗Quality of the supervisor–employee', ‗Non-monetary recognition', ‗Internal communication', ‗External communication', ‗Opportunity exploration stage', ‗Monetary reward' and ‗Promoting ideas stage'.

Specifically, most of the question items well loaded on the relative factors as expected. Only one cross-loading item was found: the item relating to ‗promotion' cross-loaded on the factors of monetary reward and non-monetary recognition (the values of the loadings: .665 and .506). As the researcher aimed to distinguish between monetary reward and non-monetary recognition, taking into account the meaning of promotion (Frank 1984; Robbins 2001), the cross-loading was ignored and this item was grouped into one form of non-monetary recognition.

The following sections present the results of the inferential statistical techniques used in the present study. To test the 18 proposed hypotheses, the Pearson

Product–Moment Correlation Coefficient was computed, as well as the Standard Multiple Regression.

4.2 Correlations

Correlations and descriptive statistics variables are reported in Table 4.2. Cronbach‘s alphas, shown along the diagonal, indicate that the measures are reliable (alphas from .701 to .933).

Table 4.2 reveals that there is a statistical correlation between most of the variables of organisational factors and the three stages of employee process innovation, except for the relationship between internal communication and generating and experimenting ideas stage of employee process innovation, and the relationship between monetary reward and opportunity exploration stage.

The results indicate that the quality of the supervisor–employee relationship correlates with opportunity exploration stage ($r=.277$, $p<.01$), idea generating and experimenting stage ($r=.111$, $p<.01$), and idea promotion stage ($r=.111$, $p<.01$). This supports the hypotheses that the quality of the supervisor–employee relationship is associated with opportunity exploration stage, idea generating and experimenting stage, and idea promotion stage of employee process innovation (Hypotheses 1a, 1b and 1c).

A correlation is shown to exist between the frequency of internal communication and the opportunity exploration stage ($r=-.066$, $p<.05$), and idea promotion stage ($r=227$, $p<.01$), supporting the hypotheses that there is an association between the frequency of internal communication and the opportunity exploration stage (Hypothesis 2a) and idea promotion stage (Hypothesis 2c). There was also a correlation between the frequency of external communication and the opportunity exploration stage ($r=.111$, $p<.01$), generating and experimenting ideas stage ($r=137$, $p<.01$), and idea promotion stage ($r=.266$, $p<.01$). This supports the hypotheses that the frequency of external communication is associated with the

opportunity exploration stage, generating and experimenting ideas stage, and idea promotion stage of employee process innovation (Hypotheses 3a, 3b and 3c).

A correlation also exists between quality of monetary reward and the generating and experimenting ideas stage ($r=176$, $p<.01$), and idea promotion stage ($r=.240$, $p<.01$), providing support that there is an association between the quality of monetary reward and the generating and experimenting ideas stage (Hypothesis 4a), and idea promotion stage (Hypothesis 4c).

A correlation was found between non-monetary recognition and the opportunity exploration stage ($r=.088$, $p<.01$), generating and experimenting ideas stage ($r=272$, $p<.01$), and idea promotion stage ($r=.331$, $p<.01$), supporting that recognition is in explaining the variance in the three stages of employee process innovation (Hypotheses 5a, 5b and 5c).

A correlation is shown to exist between training and the opportunity exploration stage ($r=340$ $p<.01$), generating and experimenting ideas ($r=.250$, $p<.01$) and the idea promotion stage ($r=187$, $p<.01$), supporting the hypotheses that there is an association between quality of training and the three stages of employee process innovation (Hypotheses 6a, 6b and 6c).

Table 4.2: Means, standard deviations and Pearson correlations among variables (N=1,299)

Construct	Mean	Std.	1	2	3	4	5	6	7	8	9
Respondent gender	1.58	.494									
Education level	3.61	.833									
The work area	4.23	2.496									
The length of work time	2.89	1.082									
Dependent variables											
Opportunity exploration	10.30	2.549									
Generating and experimenting ideas	29.17	7.698	.507**								
Ideas suggest and promotion	18.06	4.821	.465**	.587**							
Independent variables											
Supervisor–employee relationship	37.62	6.156	.277**	.111**	.111**						
Internal communication	12.47	3.746	-.066*	.019	.227**	-.203**					
External communication	12.06	6.196	.111**	.137**	.266**	.055*	.224**				
Monetary reward	9.37	3.309	.015	.176**	.240**	.047	.082**	.398**			
Non-monetary recognition	7.52	2.913	.088**	.272**	.331**	.065*	.054	.276**	.702**		
Training	18.32	4.305	.340**	.250**	.187**	.397**	-.226**	.076**	.069**	.166**	1

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed)

4.3 Multiple regression analysis

For hypotheses testing, regression analysis was employed in this study. Using regression analysis, the researcher aimed to test the effect of each organisational factor on the three stages of employee process innovation respectively. As discussed in Chapter 3, the demographical features of employees may affect their innovative work behaviour (e.g. Kanter 1984; Pinchot 1985; Mumford & Gustafson 1988; Tierney & Farmer 2002; Lee & Wong 2004). Therefore, gender, education level, work area, length of service time and organisation size acted as controls in this study. Detailed results are presented in the following sections.

It is worth noting that a standardised regression coefficient (beta coefficient) allows for a direct comparison between coefficients regarding their relative explanatory power of the dependent variable (Hair et al. 1998), but the beta coefficient should only be a guide to the relative importance of the independent variables included in the equation, and only for those variables with minimal multicollinearity (Hair et al. 1998). Thereby, prior to interpreting the regression results, the degree of multicollinearity was checked by examining the variance inflation factor (VIF) associated with each independent variable in the regression equation (Hair et al. 1998).

The VIF received its name from the fact that the square root of the VIF is the degree to which the standard error has been increased due to multicollinearity (Hair et al. 1998). It refers to an indicator of the effect that the other independent variables have on the standard error of a regression coefficient (Hair et al. 1998). It suggests that large VIF values also show a high degree of multicollinearity among the independent variables (Hair et al. 1998), but there is no commonly accepted VIF value for determining the presence of multicollinearity. According to Hair et al. (1998), values of VIF that exceed 10 are often regarded as indicating multicollinearity. The results show that VIF values that indicate multicollinearity do not appear to be an issue in this research. The maximum VIF is 1.623, which is significantly below the recommended maximum values of 10 in the literature (Hair et al. 1998). The results of the regression analysis are then presented.

To test the hypotheses, three multiple regressions were run for the dependent variable of opportunity exploration stage, generating and experimenting ideas stage, and ideas suggest and promotion stage, respectively. Each regression was run by regressing all control variables and measures of organisational factors. These regressions were used to examine the effect of organisation-related factors on each stage of employee process innovation, after controlling for the possible effect of respondents‘ and organisations‘ characteristics.

4.3.1 Opportunity exploration stage, generating and experimenting ideas stage, and promoting ideas stage

First, as shown in Table 4.3, for the opportunity exploration stage of employee process innovation, the total variance explained by the model as a whole was 24.2%, F (11, 1287)=38.63, p<.01. The results indicate that the variables of quality of the supervisor–employee relationship, external communication, non-monetary recognition and training were statistically significant, with the quality of the supervisor–employee relationship recording a higher beta value (β=.166, p<.01) than other organisation-related factors. Therefore, the hypotheses that examined the links between the supervisor–employee relationship (H1a), external communication (H3a), non-monetary recognition (H5a), training (H6a) and opportunity exploration were supported.

Table 4.3: Results of regression analyses on opportunity exploration

Variable	β (N=1,299)
Control variables	
Gender	.083***
Education	.016
Work area	-.263***
Organisation size	.109***
Work length	-.088***
Independent variables	
Quality of the supervisor–employee relationship	.166***
Internal communication	.002
External communication	.094***
Monetary reward	-.086**
Non-monetary recognition	.071**
Training	.163***
Adjusted R^2	.242
F-value	38.63 (sig .000)

Dependent variable: Opportunity exploration stage.

** p<.10; **p<.05; *** p<.01*

Second, for generating and experimenting ideas, as shown in Table 4.4, the total variance explained by the model as a whole was 15.1%, F (11, 1287)=21.94, p<.001. The results show that only the variables of non-monetary recognition and training were statistically significant. Therefore, the hypotheses that examined the links between non-monetary recognition (H5b), training (H6c), and generating and experimenting ideas were supported.

Table 4.4: Results of regression analyses on generating and experimenting ideas

Variable	β (N=1,299)
Control variables	
Gender	.083***
Education	.016
Work area	-.202***
Organisation size	.026
Work length	-.032
Independent variables	
Quality of the supervisor–employee relationship	.012
Internal communication	.041
External communication	.048
Monetary reward	-.001
Non-monetary recognition	.204**
Training	.155**
Adjusted R^2	.151
F-value	21.94 (sig .000)

Dependent variable: Generating and experimenting ideas stage.

** p<.10; **p<.05; *** p<.01*

Third, as shown in Table 4.5, for promoting ideas, the five control variables explained 10.4% of the variance. By regressing the six corporate-level factors, the total variance explained by the model as a whole was 26.7%, F (11, 1287)=44.03, p<.001. The results show that the variables of quality of the supervisor–employee relationship, internal communication, external communication, non-monetary recognition and training were statistically significant, with the non-monetary recognition recording a higher beta value (β=.270, p<.001) than others. Therefore, the hypotheses that examined the links between the supervisor–employee relationship (H1c), internal communication (H2c), external communication (H3c), monetary reward (H4c), non-monetary recognition (H5c), training (H6c) and idea promotion were supported.

Table 4.5: Results of regression analyses on idea promotion

Variable	β (N=1,299)
Control variables	
Gender	-.005
Education	.034
Work area	-.237***
Organisation size	.093***
Work length	-.034
Independent variables	
Quality of the supervisor–employee relationship	.082**
Internal communication	.223***
External communication	.131***
Monetary reward	-.025
Non-monetary recognition	.270***
Training	.070**
Adjusted R^2	.267
F-value	44.03 (sig .000)

Dependent variable: Ideas suggest and promotion stage.

** p<.10; **p<.05; *** p<.01*

In summary, for opportunity exploration, the most relevant corporate-level factors are the perceived quality of the supervisor–employee relationship, frequency of external communication and perceived quality of training. For generating and experimenting ideas, the most relevant corporate-level factors include perceived quality of non-monetary recognition and perceived quality of training. For promoting ideas, corporate-level factors including the frequency of internal communication, frequency of external communication and perceived quality of non-monetary recognition appeared to be the most relevant predictors. The results from the hypotheses testing are presented in Table 4.6.

Table 4.6: Summary of the hypotheses testing results

Hypotheses	Supported
H1a: The perceived quality of the supervisor–employee relationship is positively associated with opportunity exploration stage of employee process innovation.	Yes
H1b: The perceived quality of the supervisor–employee relationship is positively associated with generating and experimenting ideas stage of employee process innovation.	No
H1c: The perceived quality of the supervisor–employee relationship is positively associated with ideas suggest and promotion stage of employee process innovation.	Yes
H2a: The frequency of internal communication is positively associated with opportunity exploration stage of employee process innovation.	No
H2b: The frequency of internal communication is positively associated with generating and experimenting ideas stage of employee process innovation.	No
H2c: The frequency of internal communication is positively associated with ideas suggest and promotion stage of employee process innovation.	Yes
H3a: The frequency of external communication is positively associated with opportunity exploration stage of employee process innovation.	Yes
H3b: The frequency of external communication is positively associated with generating and experimenting ideas stage of employee process innovation.	No
H3c: The frequency of external communication is positively associated with ideas suggest and promotion stage of employee process innovation.	Yes
H4a: The perceived quality of monetary reward is positively associated with opportunity exploration stage of employee process innovation.	No
H4b: The perceived quality of monetary reward is positively associated with generating and experimenting ideas stage of employee process innovation.	No
H4c: The perceived quality of monetary reward is positively associated with ideas suggest and promotion stage of employee process innovation.	Yes
H5a: The perceived quality of non-monetary recognition is positively associated with opportunity exploration stage of employee process innovation.	Yes
H5b: The perceived quality of non-monetary recognition is positively associated with generating and experimenting ideas stage of employee process innovation.	Yes
H5c: The perceived quality of non-monetary recognition is positively associated with ideas suggest and promotion stage of employee process innovation.	No

H6a: The perceived quality of training is positively associated with opportunity exploration stage of employee process innovation.	Yes
H6b: The perceived quality of training is positively associated with generating and experimenting ideas stage of employee process innovation.	Yes
H6c: The perceived quality of training is positively associated with ideas suggest and promotion stage of employee process innovation.	Yes

4.4 Chapter summary

This chapter has presented the results of data analysis and hypothesis testing. The next chapter provides a discussion of the findings of the current research and recommendations for future research. Implications and limitations of the present study will also be presented in Chapters 5 and 6.

Chapter 5: Discussion

This chapter discusses the empirical results observed in this study. The discussion is organised to reflect the 18 hypotheses analysed in Chapter 4. As shown in Chapter 2, this study aims to examine the effects of organisational factors, including the quality of the supervisor–employee relationship, internal communication, external communication, monetary reward, non-monetary recognition and training, on the different stages of employee innovation behaviour that produces incremental refinements and improvements in daily work processes. In the following sections, the discussion of the results is framed in relation to employee innovation and the six organisational factors. Finally, a summary is provided at the end of this chapter.

5.1 Supervisor–employee relationship

The regression analysis proposed that the quality of the supervisor–employee relationship is positively associated with opportunity exploration (Hypothesis 1a), idea generation and experimentation (Hypothesis 1b), and idea promotion (Hypothesis 1c) of the employee innovative process. The results show a positive association between opportunity exploration and the supervisor–employee relationship quality (Hypothesis 1a), as well as a positive association between idea promotion and the quality of the supervisor–employee relationship (Hypothesis 1c). However, no relationship was found in the empirical data between idea generation and experimentation with the quality of the supervisor–employee relationship (Hypothesis 1b).

One possible explanation for the finding that the quality of the supervisor–employee relationship was not positively associated with idea generation may be that the different aspects of innovation have different aetiologies. As innovation is a social process, idea promotion is heavily reliant on the involvement of others. While an employee can generate new ideas alone, putting ideas into practice

typically depends on the approval, support and resources of others (Axtell et al. 2000). Therefore, the quality of the supervisor–employee relationship might affect the idea promotion stage. In addition, idea generation and experimentation is more dependent on an employee‘s personal characteristics (Axtell et al. 2000), which is consistent with much of the literature on creativity, which usually proposes that individual-level characteristics are likely to have more of an influence on idea experimentation than organisational factors. This might explain why the association between the quality of the supervisor–employee relationship and idea generation and experimentation stage was not supported.

Additionally, previous studies on the LMX theory argue that a higher-quality supervisor–employee relationship is associated with greater autonomy, to which employees are given latitude to carry out their tasks without excessive supervision (Basu & Green 1997). By providing employees with autonomy at work, supervisors can help create a work environment that encourages free thinking, exchange of information and the latitude to explore the opportunity for new or improved ideas. Employees are expected to have the opportunity to engage in unusual thoughts and behaviour. Hence, this study provides further evidence to support the positive effect of the quality of the supervisor–employee relationship on the opportunity exploration stage of the employee innovation process found in previous studies.

5.2 Internal communication

The current study suggested that internal communication is positively associated with opportunity exploration (Hypothesis 2a), idea generation and experimentation (Hypothesis 2b), and idea promotion (Hypothesis 2c) of the employee innovative process. The results show that the proposed positive association between idea promotion and internal communication (Hypothesis 2c) was supported. However, neither a positive association between opportunity exploration and internal communication (Hypothesis 2a), nor a positive association between idea generation and experimentation and internal communication (Hypothesis 2b), was found in the empirical data.

The finding that internal communication is positively associated with idea promotion may be because while employees can find new opportunities for improvements alone, to put them into practice, they need the support and involvement of others in their organisation (Van de Ven, Angle & Poole 1989; Axtell et al. 2000; Magadley & Birdi 2012). As promoting ideas typically depends on the support and acceptance of others, communication with others might be helpful in facilitating employees to promote their innovative ideas at work. Thus, the proposed association between it and the idea promotion stage of employee process innovation was supported in the present study.

One possible explanation for the finding that internal communication was neither positively associated with idea generation nor with the opportunity exploration stage might be that individual-level factors such as creative self-efficacy are important for the generation of novel ideas (Magadley & Birdi 2012). Prior research (e.g. Axtell et al. 2000) suggested that organisations wishing to encourage employees to generate new ideas should focus on the individual-level factors. Another possible explanation is that as previous studies suggested, a high level of communication frequency can create mutual production blocking, which means a tendency for one individual to inhibit or block other people during a group discussion (e.g. Diehl & Stroebe 1987), which can limit the cognitive capacity of employees (Nijstad 2000). This is supported by prior research (Perry-Smith & Shalley 2003), which argued that too-frequent communication within organisations might discourage employees from generating new ideas. Amabile and Conti (1999) also suggested that if the frequency of communication at work reaches a certain level, the mutual influence becomes so high that it deteriorates the work environment for innovative work performance up to the situation in which group thinking (Janis 1972) occurs. Lönsisalmi, Peiro and Kivimaki (2000) also proposed that very frequent interaction among employees might overburden personnel with having to attend too many meetings and overload them with information, which in turn discourages innovative activities.

5.3 External communication

The empirical data also suggested that external communication helps to facilitate opportunity exploration (Hypothesis 3a), idea generation and experimentation (Hypothesis 3b), and idea promotion (Hypothesis 3c) of the innovative process of employees. The results show a positive association between the opportunity exploration stage and external communication (Hypothesis 3a), and a positive association between the idea promotion stage and external communication (Hypothesis 3c). However, the association between the idea generation and experimentation stage and external communication (Hypothesis 3b) was not found in the empirical data.

The finding that internal communication is positively associated with the opportunity exploration stage may be because employees‘ diverse contacts at work might expose them to more various perspectives and ideas (De Jong & Den Hartog 2010). With diverse networks, employees are expected to be more likely to obtain various information and ideas, and to discover the opportunity for sparking ideas at work. Prior research proposed that outside contacts such as customers could contribute to innovations (e.g. Von Hippel 1988). This is also in line with the findings of Perry-Smith and Shalley (2003), who confirmed that diverse external networks allow employees to be exposed to non-redundant information and therefore boost deviant behaviour. This would create opportunities for employees in championing ideas.

In addition, as showed earlier, generating ideas is heavily reliant on individual-level factors such as domain expertise, which includes relevant skills and knowledge (Magadley & Birdi 2012). Individual-level characteristics are likely to have more of an influence on employees experimenting with ideas than organisational factors (Axtell et al. 2000). This might explain why no relationship was found between external communication and idea generation and experimentation. Another possible explanation is that, similar to communication within organisations, very frequent external communication might discourage employees‘ efforts in generating new ideas. For example, Kratzer, Leenders and

Engelen (2004) suggested that very frequent communication might mould the environment in such a way that mutual production blocking occurs or the mutual influence restricts individual attempts to perform creatively. It suggested that both quantity and quality of communication is important for employees generating new ideas (Ohly, Kase & Škerlavaj 2010). This suggests that more research is needed to examine the effect of communication at work on employee innovation from a broader perspective (i.e. investigating both frequency and quality).

5.4 Reward and recognition

It was found that the quality of monetary reward is positively associated with the opportunity exploration stage (Hypothesis 4a), idea generation and experimentation stage (Hypothesis 4b), and idea promotion stage (Hypothesis 4c) of the employee innovative process. The results show that only a positive association between the idea promotion stage and quality of monetary reward (Hypothesis 4c) was supported. However, neither an association between the opportunity exploration stage and quality of monetary reward (Hypothesis 4a), nor an association between the idea generation and experimentation stage and quality of monetary reward (Hypothesis 4b), was found in the empirical data.

The empirical data also suggested that quality of non-monetary recognition is positively associated with opportunity exploration (Hypothesis 5a), idea generation and experimentation (Hypothesis 5b), and idea promotion (Hypothesis 5c) of the employee innovative process. The results show that a positive association between opportunity exploration and quality of non-monetary recognition (Hypothesis 5a) was supported, and a positive association between idea generation and experimentation and quality of non-monetary recognition (Hypothesis 5b) was also supported. However, an association between idea promotion and quality of non-monetary recognition (Hypothesis 5c) was not found in the empirical data.

One possible explanation for the findings is that creativity can be viewed as self-motivated psychological behaviour that is typically sparked by an intrinsic

spiritual reward (Deci & Ryan 1985; Amabile 1997; Hennessey & Amabile 1998). This implies that an intrinsic reward is likely to have more of an influence on employees looking for opportunities for innovation. In this way, employees are expected to have the opportunity to engage in unusual thoughts and behaviour, and to look for new opportunities. This might explain why the proposed association between non-monetary recognition and the opportunity exploration stage was supported.

Another possible explanation for these findings is that although most reward systems are designed with the view that money can motivate employees and higher compensation can improve employee performance (Lawler 1969), prior research suggested that monetary incentives might not have the same effect across different categories of employees. Rynes and Gerhart (2003) confirmed this and suggested that employees might favour different incentives according to their needs, education, social status or circumstances.

In addition, despite the theoretical and empirical evidence showing the positive effect of monetary reward on employee creativity, some previous research (e.g. Deci & Ryan 1985; Amabile et al. 1996; Cooper 1999) revealed that monetary reward might not be the best incentive to stimulate idea generation. Monetary reward might reduce the autonomy and self-motivation of employees, diverting their attention to economic benefits and weakening their proactive innovative behaviour. In this way, consistent with some of the literature on creativity (e.g. Lepper, Greene & Nisbett 1973; Lepper & Greence 1978), excessive monetary reward might depress employee innovative behaviour towards idea generation and experimentation by eroding self-motivation (Zhou, Zhang & Montoro-Sánchez 2011). This might also explain why the association between monetary reward and the idea generation and experimentation stage was not supported.

In contrast, given that generating and experimenting ideas is more dependent on an employee‘s personal characteristics (Axtell et al. 2000), and intrinsic motivation has been suggested to be related to a person‘s need for personal development, such as the feeling of enjoyment and accomplishment that accrue

spontaneously as a person engages freely in the target activities (Deci, Ryan & Williams 1996), it has been proposed that intrinsic rewards are likely to have more of an influence than monetary reward on experimentation with new ideas.. In support, Lu and Zhang (2007) suggested that a high level of intrinsic work motivation might make employees more self-motivated and therefore more involved in innovative behaviour towards idea generation. This might explain why the association between non-monetary recognition and the idea generation and experimentation stage was supported.

As discussed in the literature review, innovation is a social process. Accordingly, as Lu and Zhang (2007) suggested, once an employee generates a new idea, intrinsic motivation might play a weaker role in influencing the following stages of individual innovation, such as the implementation of the ideas stage. This is because, as discussed earlier, while an employee can generate ideas alone, promoting ideas is heavily reliant on the involvement of others. In this way, extrinsic motivators might have more of an influence on employees compared with self-motivation. This is supported by Lu and Zhang (2007), who suggested that employees might feel less self-motivated when they need to obtain support from the organisation. In this way, a tangible reward is likely to have more of an influence on the idea promotion stage. This might explain why the proposed association between monetary reward and the idea promotion stage was supported, but the association between non-monetary recognition and the idea promotion stage was not supported.

5.5 Training

The regression analysis confirmed that training is positively associated with the opportunity exploration stage (Hypothesis 6a), idea generation and experimentation stage (Hypothesis 6b), and idea promotion stage (Hypothesis 6c) of the employee innovation process towards process innovation. The results show positive associations between quality of training and all three stages of employee innovation process were supported.

The empirical findings indicated that training was associated with the three stages of employee process innovation to different extents. The results indicate that training was more strongly associated with the opportunity exploration stage compared with its associations with the idea generation and experimentation stage, and idea promotion stage. This finding is in line with the stage-specific research direction proposed in the existing literature (e.g. Birdi 2007), which suggested that employees might require different skills, knowledge and capabilities for different stages of the innovation process. Therefore, it is reasonable that training could have different effects by stages of the employee innovation process. Our findings provide empirical evidence supporting the notion that the influence of training on the stages of the employee innovative process may differ.

Additionally, one possible explanation for the finding that training was more strongly associated with opportunity exploration than other stages of process innovation is that following previous literature (e.g. Van de Ven, Angle & Poole 1989), exploring opportunities to innovate is primarily an internal process, whereas putting novel ideas into practice and promoting them to others tends to be a social process that requires the involvement of others. For example, employees often need time, resources, support and agreement from those in authority or those affected by the potential changes. Such environmental factors are not under the influence of the individual employee. Therefore, training might be limited to mainly stimulating employees to explore opportunities for generating ideas, while other features more directly dictate whether those ideas are put into practice. In support, Birdi (2007) suggested that certain creativity training activities can affect increasing the generation of ideas by employees, but environmental factors such as managerial support have a greater influence on whether such ideas are put into practice.

Previous studies on training argue that employees can enhance their capabilities and skills needed for work through training and development (e.g. Basadur 2004). The general support for such an effect on the employee innovation process from idea generation to idea implementation has been provided. For example, training and development have been linked to receptivity to new ideas and innovations as

well as to the generation of innovative proposals (Thompson 1965; Katz & Tushman 1981; Damanpour 1991; Hurley & Hult 1998). As training and development improve an employee‘s ability to diagnose and solve technical problems, the odds are increased that innovative proposals will become effective practices (McGinnis & Ackelsberg 1983; Dewar & Dutton 1986). Along these lines, employees should be able to generate more ideas at work and, as a result, have more of their ideas implemented if they are receiving methods for developing more solutions or ideas (Clegg et al. 2002). The present study provides further evidence to support the positive effects of training on employee process innovation.

5.6 Effects of organisational factors on stages of employee process innovation

This study empirically distinguishes between the different dimensions of employee innovation by identifying that employee innovation could be viewed as a process consisting of the opportunity exploration stage, idea generation and experimentation stage, and the idea promotion stage. This is in line with the pattern identified by previous work (Kanter 1988; Scott & Bruce 1994; Oldham & Cummings 1996; Axtell et al. 2000; Kleysen & Street 2001; De Jong & Den Hartog 2010; Holman et al. 2011). Further, along with the direction proposed that future research should make further distinctions between stages of innovation (Hemphälä & Magnusson 2012), our findings provide empirical evidence supporting the notion that different stages of innovation can have different organisational correlations (Axtell et al. 2000; Birdi 2007; Magadley & Birdi 2012). For innovation management practice, the findings imply that organisations wishing to promote opportunity exploration for innovation, idea generation and experimentation, and idea promotion among employees should focus on different organisational factors, which could help to facilitate employee innovation in daily work processes effectively and efficiently.

Specifically, as shown in Figure 5.1, this research found that the quality of the supervisor–employee relationship, external communication, non-monetary

recognition and training were positively associated with the opportunity exploration stage. Non-monetary recognition and training were positively associated with the idea generation and experimentation stage. The quality of the supervisor–employee relationship, internal communication, external communication, monetary reward and training were positively associated with the idea promotion stage. Each stage of the employee innovation process is discussed in the following sections.

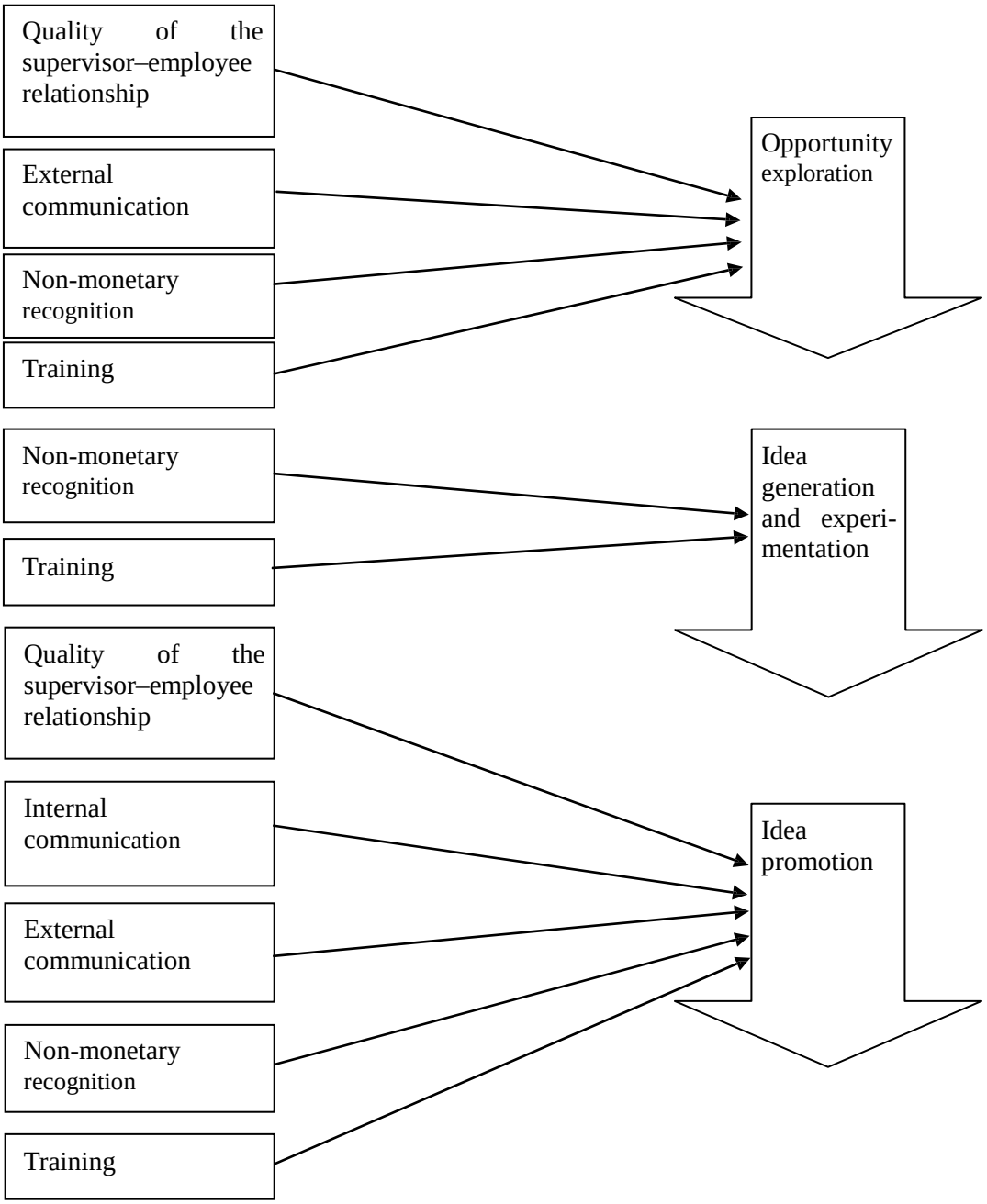

Figure 5.1: Effects of organisational factors on different stages of the employee innovation process

5.6.1 Opportunity exploration stage

This study explicitly found that four organisational factors were positively associated with opportunity exploration. This confirms the value of continuing to develop theories and research that explores how organisational factors are associated with fostering the process innovation of employees by stages and which factors are associated with facilitating employee opportunity exploration specifically.

Opportunity exploration of employees can be viewed as a starting point for employee innovation, which is important because employees need to break out of the routine of doing things and consider making an extra effort for change in the workplace (e.g. Kleysen & Street 2001). More specifically, opportunities to generate ideas often lie in incongruities and discontinuities—things that do not fit expected patterns, such as problems in existing work methods, unfulfilled needs of customers or indications that trends may be changing (De Jong & Den Hartog 2007).

Extant literature suggested that employees are required to be both able and willing to be innovative (e.g. Huhtala & Parzefall 2007). In this respect, this research explicitly found that four organisational factors were positively associated with opportunity exploration: quality of the supervisor–employee relationship, external communication, non-monetary recognition and training.

With respect to abilities, general skills and task- and context-specific knowledge might be important to drive employees who explore opportunities for innovation (e.g. Barron & Harrington 1981). As Shalley and Gilson (2004) suggested, employees need to be more aware of different alternatives and opportunities for innovation by developing a more extensive skill set. This implies the important role of external communication, which was suggested to be one source of new ideas (De Jong & Den Hartog 2010), and training, which could be used to help employees learn more about the skills and knowledge (Basadur 2004) in facilitating employees to explore opportunities for innovation.

Specifically, this study empirically suggests that external communication can affect opportunity exploration because it allows employees to obtain information and ideas, and to discover the opportunity for innovative ideas in the workplace (e.g. De Jong & Den Hartog 2010; Perry-Smith & Shalley 2003). In addition, as training involves providing employees with basic knowledge and skills (e.g. Costen & Salazar 2011; Johannessen & Olsen 2003; Lau & Ngo 2004), and training strategies have been found to enhance individuals‘ creative thinking skills and problem-solving abilities (e.g. Feldhusen & Goh 1995), this study supports the notion that training can affect the opportunity exploration of employees by ensuring they are able to innovate.

Beyond skills and knowledge, management needs to push employees to persevere in the face of challenges inherent in innovative work (Georgsdottir & Getz 2004; Shalley & Gilson 2004). Current results are in line with this view by supporting the positive effects of the quality of the supervisor–employee relationship and non-monetary recognition. Specifically, based on the extant work, which suggests that it is important to make employees feel encouraged to take risks and break out of safe ways of doing things if management wants them to be willing to explore opportunities for innovation (e.g. Shalley & Gilson 2004), this study takes a further step by explicitly suggesting that the organisational factors of the quality of the supervisor–employee relationship and non-monetary recognition concerning supervisor support and self-motivation might be important to facilitate opportunity exploration. Future theory and research should pay more attention to the issue of whether there is a causal relationship between these specific organisational factors and opportunity exploration, and how these factors influence employee innovative behaviour towards opportunity exploration.

5.6.2 Idea generation and experimentation stage

This study explicitly found that two organisational factors were positively associated with idea generation and experimentation. This confirms the value of continuing to develop theories and research, which explores how organisational factors are associated with fostering the process innovation of employees by

stages and which factors are associated with facilitating idea generation and the experimentation of employees specifically.

Idea generation and the experimentation of employees refer to employees generating new ideas and trying them out before promoting them to others (e.g. Kleysen & Street 2001). This research found that only two organisational factors were positively associated with opportunity exploration: non-monetary recognition and training. This confirms the view that employees might not heavily rely on the involvement of others because they can generate new ideas alone (Axtell et al. 2000), and intrinsic motivation could be useful to facilitate idea generation (Amabile 1979; Amabile, Goldfarb & Brackfield 1990).

Specifically, the extant literature proposed that intrinsically motivated employees are more likely to explore new pathways and to take greater risks for generating new ideas (Amabile, Goldfarb & Brackfield 1990) because they need to be sufficiently interested in a certain problem and/or outcome and in finding ways to solve or achieve it (Coelho, Augusto & Lages 2011). In this way, they will be more excited about their work, and this in turn increases their idea generation (Shalley, Zhou & Oldham 2004).

This study further supports this view by identifying the positive associations between idea generation and experimentation and two organisational factors. Specifically, this study suggests that recognition that is linked to intrinsic motivation can affect the idea generation of employees (e.g. Eisenberger & Armeli 1997; McAdam & McClelland 2002). Additionally, as Shalley and Gilson (2004) suggested, by developing a more extensive skill set through training, employees should be more comfortable in trying new things. The findings of this study suggest that with training, employees might be more likely to perform not only their work, but also be curious about other solutions, options or ways of doing their work so that idea generation and experimentation can occur.

Relevant theories and research should further examine the view that intrinsically motivated employees might be more likely to generate new ideas in the workplace.

The issue of which specific organisational factors could drive employees to generate new ideas and how they could influence employee innovative behaviour should be researched further.

5.6.3 Idea promotion stage

This study explicitly found that five organisational factors were positively associated with idea promotion. This confirms the value of continuing to develop theories and research that explores how organisational factors are associated with fostering the process innovation of employees by stages and which factors are associated with facilitating employee idea promotion specifically.

The idea promotion stage is about employees promoting new ideas to others. Extant work suggested that promoting ideas is related to the involvement of others in terms of support and resources from their organisation (e.g. Axtell et al. 2000). This study suggests that the quality of the supervisor–employee relationship, internal communication, external communication, non-monetary recognition and training might help to distribute and promote ideas, whereas monetary reward was not positively associated with the idea promotion of employees. To examine whether these factors can drive employees to promote the new ideas, and to what extent, theories and research should focus on the organisational factors that might foster employees to promote new ideas.

Interestingly, the finding shows that opportunity exploration, idea generation and experimentation, and idea promotion have different correlations. This agrees with the stage-specific perspective on innovation (e.g. Axtell et al. 2000; Magadley & Birdi 2012) and advances the employee innovation literature by addressing the specific influence of organisational factors on different stages of employee innovation respectively. It suggests that the factors identified as antecedents to employees‘ idea generation and development (e.g. Amabile 1996; Shalley & Zhou 2004; Woodman, Sawyer & Griffin 1993) might need to be investigated in more detail because factors that specifically facilitate opportunity exploration might not affect idea generation or idea promotion.

Additionally, as mentioned in Chapter 5, this study included gender, education level, work area, work length and organisation size as control variables. In doing so, it was expected to gain an in-depth understanding of the organisation‘s influence on employee innovation in the workplace. This study found that controlling for these factors, a different mix of organisational factors was positively associated with different stages of employee innovation. The results suggest that these associations were not affected by the gender, education level or work length of employees, whereas the variables of work area and organisation size might influence the associations. This indicates that the findings might not hold equally true for employees from specialised technical work areas or less specialised functional areas, or for employees from large-, small- or medium-sized organisations. This finding can be explained by previous work (Kanter 1984; Pinchot 1985), which suggested that work experience from technical-oriented work might improve the likelihood of entrepreneurial behaviour, and large organisations could offer more opportunities for learning experiences for employees. Future theory and research should examine whether the influence of these organisational factors can work in the same way for employees with different demographical characteristics.

In conclusion, as empirical evidence showed that organisational factors could affect different aspects of employee innovation process, this study has drawn attention to the need to extend theoretical understanding of the interactions between the organisational factors and different stages of the employee innovation process. The identified relationships between organisational factors and the stages of employee innovation process should be examined in greater detail to understand how they affect an organisation‘s ability to facilitate employee innovation (Smith et al. 2008). In addition, it is important to distinguish between different stages, and clearly clarify which of these stages is being investigated when considering innovation models, future theory and research on employee innovation should focus in greater depth on the factors that relate differently to the stages of innovation process.

5.7 Chapter summary

This chapter discussed the empirical results of the data analysis undertaken to address the hypotheses, regarding the effect of the quality of the supervisor–employee relationship, internal communication, external communication, monetary reward, non-monetary recognition and training on employee process innovation stage by stage. The results show that organisational factors differently affect the stages of employee innovation. Specifically, the quality of the supervisor–employee relationship, external communication, non-monetary recognition and training were found to play a significant role to facilitate opportunity exploration while non-monetary recognition and training encouraged idea generation and experimentation. Moreover, the quality of the supervisor–employee relationship, internal communication, external communication, non-monetary recognition and training helped to distribute and promote ideas. The following chapter will conclude with theoretical and practical implications, as well as the limitations and potential directions for future research.

Chapter 6: Conclusion

This chapter examines theoretical and practical implications, as well as limitations and potential directions for future research. Overall conclusions are provided at the end of this chapter.

6.1 Implications

This study has important theoretical implications for employee innovation research and practical implications for organisations to encourage employee innovation in daily working processes. Detailed discussions are presented in the following sections.

6.1.1 Theoretical implications

By examining the link between different stages of employee innovation concerning incremental refinements and improvements in daily work processes and organisational factors, one key theoretical implication is that different stages of employee innovation are positively associated with a different mix of organisational factors. This implies that future research is needed to discover which organisational factors are more important in facilitating specific stages of the employee innovation process. There has been a need to empirically investigate the specific connection between organisational factors and different stages of employee innovation. Along this line, Denti and Hemlin (2012) found that in the early stages of innovation, leaders may have to take a divergent and explorative approach to problem construction and ideation in which knowledge and ideas are broadly integrated.

In addition, this study contributes to employee innovation literature by explicitly investigating employee process innovation concerning incremental and minor refinements and improvements in employees‘ daily working processes.

Considering the distinction between incremental innovation and radical innovation (e.g. Isaksen & Tidd 2006), this study has taken the first step in extending innovation research by explicitly addressing incremental process innovation rather than radical innovation. Specifically, by examining the incremental innovation of employees, it has showed that six organisational factors—supervisor–employee relationship, internal communication, external communication, monetary reward, non-monetary recognition and training—are relevant to employee innovation regarding expanding and refining existing processes.

Moreover, this study contributes to the literature in its stage-specific perspective on employee innovation. This research confirms the value of adopting a multi-stage perspective on employee innovation. By doing so, people can explore how each stage can affect different organisational factors.

Further, as this study empirically tested the effects of organisational factors in the context of China, it provides a unique environment for investigating such effects compared with western countries (Zhou, Zhang & Montoro-Sánchez 2011).

Specifically, as Madjar, Oldham and Pratt (2002) suggested, different results could be obtained in different countries. In particular, as Hon (2010) noted, previous findings from western literature may not apply to Asia because the innovative performance of employees depends on social–contextual factors such as leadership behaviour (e.g. Scott & Bruce 1994; Woodman et al. 1993). Additionally, as McClelland (1987) suggested, the achievement motive involving the creation of more efficient ways of doing things and solving problems may not apply to Chinese employees, whereas the avoidance motive might be high in China, as the fear of being punished for mistakes seems to be deep-rooted in the traditional culture of mainland China (McClelland 1987; Schermerhorn & Nyaw 1990). This may lead to passivity in the workplace, where taking risks is avoided (Jackson & Bak 1998). This in turn discourages employee behaviour towards innovation in daily work processes. However, there have been few empirical

studies of the application of the employee innovation process in the Chinese context.

Consistent with previous studies (Jackson & Bak 1998; Wang, Xu & Su 2010), this study provides the first step in determining whether Chinese employees may be motivated differently in the workplace compared with the western world, and it enriches the understanding of how to facilitate the employee innovation process in the global context.

6.1.2 Practical implications

With regard to practice, in influencing employee process innovation, organisational factors such as the supervisor–employee relationship, internal communication, external communication, monetary reward, non-monetary recognition and training are important. Specifically, organisations need to recognise that the factors that may facilitate the employee innovation process and the skills required can be different depending on the stage of the innovation. While it has been proposed that organisations wishing to facilitate employees‘ idea generation should focus on individual-level factors such as self-efficacy and domain expertise, which could be developed by a host of training initiatives (Magadley & Birdi 2012), the findings of this study provide empirical support for the view that there needs to be effective organisational support for ideas to be put into practice. Moreover, this study further comments that while employees can generate new ideas alone, they need the support and involvement of others in their organisation to put them into practice.

From a practical perspective, this study will help business managers to improve their understanding of the different stages of employee process innovation and the role of organisational-level factors in facilitating employee innovation. The findings suggest that business managers could utilise organisational resources to improve the innovative behaviour of employees in their daily work rather than focusing solely on product innovation. Additionally, the findings of this study imply that business managers should also target the correct organisational support

for each stage of employee innovative behaviour in order to maximise employee innovative behaviour. In particular, if an organisation focuses on fostering their employees to generate novel ideas at work, they could invest in improving the quality of the supervisor–employee relationship, external communication, non-monetary recognition and training for their employees. In addition, investing in non-monetary recognition and training might help their employees to generate and experiment with ideas. Moreover, to foster their employees to promote novel ideas, this study recommends investing in the quality of the supervisor–employee relationship, internal communication, external communication, monetary reward and training.

In addition, this study finds that the organisational factors can significantly impact on the incremental process innovation of the employees. The results had no much difference with previous studies in Western cultural setting (e.g. Scott & Bruce 1994). This suggests that organisations can improve the innovation and creativity of the employees by systematically implementing well–designed measures at the organisational level though the cultural values and traditions of China differ from the rest part of the world.

6.2 Limitations of the study

Several limitations of this study should be noted. These limitations can be categorised in terms of the study sample and its method.

One sample limitation of the research lies in its focus on a single country, which restricted the generalisability of the findings in different situations. The study results may reflect its specific characteristic and may not therefore be generalisable to other countries. There is a need for future research outside China to examine whether the findings developed in this study hold true for different settings.

Although the statistical analyses suggested that the sample for this study was acceptable, the convenience sampling method has a limitation in that the findings

cannot be generalised. Thus, it is preferable to use a random sample. Another sample limitation stems from the possibility of sampling selection bias. However, this study paves the way for future research to explore whether the findings could apply to other samples and populations. Future research should also examine whether the theoretical model proposed in this study also holds true for different people.

This study is cross-sectional. The cross-sectional research design only established associations between variables. Therefore, this research cannot make any definitive statements regarding the causality of the included variables (Huang, Rode & Schroeder 2011). For future research, it is suggested that a case study design be used to further examine the underlying logic of how corporate-level factors can facilitate employee process innovation and thus provide evidence for the causal relationship among the variables. According to Saunders, Lewis and Thornhill (2000), interviews provide the most suitable research tool in situations where researchers need to understand the background for respondents‘ decisions or attitudes. In-depth qualitative methods would enable the gathering of rich data that may reflect personal comments from employees about their feelings and perceptions about the influence of organisational factors on their innovative behaviour.

In addition, this study is based on self-reporting data. All of the included variables were measured with surveys that relied on perceptually based measures. The subjective and potentially idiosyncratic nature of respondents‘ reporting of their views that might influence their innovative behaviour must be acknowledged. This subjectivity should be kept in mind when interpreting the findings of this study.

It is also noted that, common method variance (Podsakoff & Organ, 1986) could be a potential bias in this study because the respondent is the only data source for independent variables and dependent variables. Though the researcher has tried to use Harman‘s one–factor test (Schriesheim 1979) to address the common method bias issue, the problem cannot be really solved.

Another potential bias concerns social desirability, which is potentially due to the respondents perceiving them to be the ‚right' answers to the questions offered. To be innovative and helpful towards benefiting one organisation is desirable, and the respondents might be tempted to report such behaviour. In addition, this bias might occur because it should be noted that innovative behaviour deviates from prescribed roles; therefore, in some cases, it might be considered threatening by colleagues and supervisors (Åmo & Kolvereid 2005).

6.3 Future research directions

There are several possible directions for future research. First, as the cross-sectional design does not permit the interference of the causal-effect relationship, future researchers might employ a case study research design to provide evidence for causality. There should be more longitudinal studies with comparison groups so that causality can be fully established. Second, future research needs to be based on objective indicators and multiple sources. Model variables should be linked to additional sources of data that do not rely on self-report measures and that include multiple management-level informants and case studies. Multiple sources would allow for multi-level insights into the influence of corporate-level factors on employee innovative behaviour, which single-source surveys cannot reveal.

Third, methodologically, it is recommended to use the mixed research method. The approach taken in this study was quantitative, and while qualitative methods help to gather a rich understanding of the research object (Djojosaputro, Nguyen & Peszynski 2005), the qualitative method could provide a more in-depth understanding to reinforce the explanation of the statistical results of quantitative data (Teddlie & Tashakkori 2003). In-depth qualitative methods would help to gather rich data that might achieve more comprehensive insights into the influence of corporate-level factors on employee innovative behaviour from the perspectives of employees and managers. Moreover, the comments gathered using the qualitative method might reveal new insights regarding influences on

employee innovative behaviour that are not covered in the quantitative research design.

Fourth, this empirical study was conducted in the context of China. This research paves the way for future studies to explore whether the findings also hold true for other settings. Similar studies can be conducted in other countries to test this study‘s findings and thus determine the generalisability of this construct. More studies are needed in both western and non-western organisations.

A direct comparison of the effects of organisational factors on the employees between China and Western countries would help identify how different cultures may impact on the innovative behaviour of the employees. It is suggested that future studies could examine the effects of cultural values and traditions on the incremental process innovation of employees.

In addition, the regression analysis results of this study indicated that organisation size and the work area of employees could be relevant to the influence of organisational factors on employee innovative behaviour towards incremental innovation. Specifically, it showed that the findings might not hold equally true for employees from specialised technical work areas or less specialised functional areas, or for employees from large-, small- or medium-sized organisations. As the findings cannot be generalised to people or settings other than the ones in this study due to the use of a convenience sample, future research could explore this to examine whether the theoretical model of employee innovative behaviour towards process innovation holds equally true for employees from different work areas or different-sized organisations, and address the issues of how it would differ.

Finally, employee innovation is not only influenced by organisational factors. Future research could consider synthetic interactions of different-level factors, including employee and organisation levels on employee innovation, rather than investigate their influences separately. In particular, it is recommended that future research examine the combined effects of such personal and contextual conditions

on employee process innovation towards incremental refinements and increasing the efficiency of existing daily work processes.

6.4 Summary

This study set out to examine the six important organisational factors that facilitate employee innovation towards incremental refinements and improvements in daily work processes stage by stage, namely opportunity exploration, idea generation and experimenting, and idea promotion. The results suggest that organisation-related factors might relate differently to different stages of employee innovation (e.g. Birdi 2007; Axtell et al. 2000).

Recognising such different influences on the stages of employee process innovation is critical for organisations to understand how to make the best use of these common corporate resources to effectively facilitate employee process innovative behaviour. In particular, recognising the importance of employee incremental process innovation at work and paying more attention to the different influences of corporate resources on the stages of employee process innovative behaviour are important to facilitate employee innovation by leveraging corporate resources for organisations.

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Appendix A: Survey Instrument

QUESTIONNAIRE SURVEY

Facilitate Individual Innovation in Organisations

Dear employees,

You are invited to participate in a research project being conducted in partial fulfilment of a Master's degree for one of the investigators, Jingjing Wang under the supervision of the chief investigator, Dr Fan Liang, and the co-investigator, Dr Megan Woods, of the School of Management at the University of Tasmania. The research aims to identify key corporate factors that facilitate individual innovation at workplace and explore how companies can facilitate individual innovation by leveraging available corporate resources.

This questionnaire consists of six sections and it is anticipated that it will take no more than fifteen minutes to complete. Please tick the most appropriate option using the scale that follows or write your answer if needed. You are encouraged to complete the questionnaire in an honest way as your answers would greatly constitute to our research. Your participation in this study is entirely voluntary. You have the right to decline. If you wish to take part in it, please complete the questionnaire and put it into the envelope provided for you and return it through your managers who are in charge of distributing and collecting the questionnaires.

All answers to questions in this questionnaire remain anonymous and all information will be treated confidentially. The survey data will be used for statistical analyses only and you will not be identified in the research. All the completed questionnaires will be kept securely in a locked cabinet in the office of School of Management at University of Tasmania. All data will be stored for five years and then securely destroyed.

If you would like to discuss any aspect of this study please feel free to contact Jingjing Wang. This study has been approved by the Tasmanian Social Science Human Research Ethics Committee. Any concerns or complaints about this study can be directed to the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 7479 or email to human.ethics@utas.edu.au.You will need to quote ethics reference number H11495.

Thank you for your cooperation.

Return of completed questionnaire through your managers is an indication that you have given your consent to participate in this study.

Kind regards,

Jingjing Wang

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Building 103, Residential compound of Shandong Agricultural University

Tai'an city Shandong China 271000

Phone: +86 15165482232

Email: jwang5@postoffice.utas.edu.au

Section A: General information

1. Your age:
2. Gender:
3. Your highest educational qualification (please circle one):
   (1) High school (2) Technical & Vocational Institutions
   (3) Graduate diploma or certificate (4) Bachelor
   (5) Master (6) PhD
4. The industry of your organisation (please circle one):
   (1) Manufacturing (2) Services
   (3) Wholesale and retail trade (4) Education
   (5) Infrastructure (6) Energy
5. The ownership type of your organisation (please circle one):
   (1) State-owned enterprise (2) Collective-owned enterprise
   (3) Cooperative enterprise (4) Joint ownership enterprise
   (5) Limited Liability Corporation (6) Share-holding Corporations Ltd.
   (7) Private Enterprise (8) Joint venture with investment from Hong Kong, Macao and Taiwan & Enterprises with foreign investment
6. The number of employees your organisation has:
   (1)<5 (2) 5-20 (3) 21-100
   (4) 101-200 (5) 201-500 (6) 501-100 (7) ≥ 1001
7. Your organisation was established in Year____; or it has operated for (please circle one):
   (1)<1 year (2) 1-5 years (3) 6-10 years
   (4) 11-20 years (5) >20 years
8. The area you work in (please circle one):
   (1) Sales (2) Advertising & marketing (3) Finance & accounting
   (4) R&D (5) Human resources (6) General administration
   (7) Technical (8) Production & operation (9) other (specify) _____
9. How long have you been employed in this organisation (please circle one)?
   (1) < 3 months (2) 3 months-1 year (3) 1-3years
   (4) 3-5 years (5) 5-10 years (6) 10-20 years (7) >20 years

Please circle the most appropriate answer for each question.

Section B: ***In your current work, how often do you:***

10. Look for opportunities to improve an existing process at work?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
11. Recognise opportunities to make a positive difference in your work?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
12. Pay attention to non-routine issues in your work?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
13. Generate ideas or solutions to address problems you find in your work?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
14. Look at the big picture to gain greater insight into them?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
15. Experiment with new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

16. Test-out the solutions for current problems?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
17. Evaluate the strengths and weakness of new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
18. Implement changes that seem to make your job easier or more efficient?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
19. Work the bugs out of new approaches when applying them to an existing process?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
20. Incorporate new ideas for improving an existing process into daily routines?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
21. Try to persuade others of the importance of a new idea or solution?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
22. Put ideas forward to colleagues so that they have a chance to become implemented by others?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
23. Put ideas forward to supervisor-level people so they have a change to become implemented at the corporate level?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
24. Take the risk to promote own new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
25. Take the risk to support other colleagues‘ new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
26. Take the risk to promote own new ideas but not the risk to support other colleagues‘ new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
27. Take the risk to support other colleagues‘ new ideas but not the risk to generate & promote own new ideas?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

Section C: **Supervisor–employee relationship**

28. You know where you stand with your supervisor.
    (Totally disagree) ***(Strongly disagree)*** ***(Neutral disagree)*** ***(Neither agree nor disagree)***
    (Neutral agree) ***(Strongly agree)*** ***(Totally agree)***
29. You know how satisfied your supervisor is with what you do.
    (Totally disagree) ***(Strongly disagree)*** ***(Neutral disagree)*** ***(Neither agree nor disagree)***
    (Neutral agree) ***(Strongly agree)*** ***(Totally agree)***
30. Your supervisor understands your job problems and needs.
    (Totally disagree) ***(Strongly disagree)*** ***(Neutral disagree)*** ***(Neither agree nor disagree)***
    (Neutral agree) ***(Strongly agree)*** ***(Totally agree)***
31. Your supervisor can recognise your potential.
    (Totally disagree) ***(Strongly disagree)*** ***(Neutral disagree)*** ***(Neither agree nor disagree)***
    (Neutral agree) ***(Strongly agree)*** ***(Totally agree)***

32. Your supervisor uses his or her power to help you solve problems in your work.
    (Totally disagree) (Strongly disagree) (Neutral disagree) (Neither agree nor disagree) (Neutral agree) (Strongly agree) (Totally agree)
33. Your supervisor will ‗bail you out' at his or her expense.
    (Totally disagree) (Strongly disagree) (Neutral disagree) (Neither agree nor disagree) (Neutral agree) (Strongly agree) (Totally agree)
34. You have enough confidence in your supervisor that you would defend and justify his or her decision if he or she were not present to do so.
    (Totally disagree) (Strongly disagree) (Neutral disagree) (Neither agree nor disagree) (Neutral agree) (Strongly agree) (Totally agree)
35. You would characterize your working relationship with your supervisor as effective.
    (Totally disagree) (Strongly disagree) (Neutral disagree) (Neither agree nor disagree) (Neutral agree) (Strongly agree) (Totally agree)

Section D: Communication at workplace

In the same work area, you:

36. Communicate with employees who have similar job tasks.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
37. Communicate with employees who have different job tasks.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)

In different work area from yours, you:

38. Communicate with employees who have similar job tasks.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
39. Communicate with employees who have different job tasks.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
40. How many people do you interact with in your daily work within your organisation?
    (1) None (2) 1-3 (3) 4-6 (4) 7-9 (5) 10-12 (6) 13-15 (7) >15

For communication with outsiders of your organisation for work, you:

41. Visit conferences, trade fairs and/or expositions, on your organisation‗s behalf.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
42. Keep in touch with customers, on your organisation‗s behalf.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
43. Keep in touch with other companies in the same industry, on your organisation‗s behalf.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)
44. Keep in touch with research institutions/universities, on your organisation‗s behalf.
    (Not at all) (Daily) (Weekly) (Monthly) (Quarterly) (Half yearly) (Yearly)

Section E: Rewards and recognition

45. Which of the following tangible rewards does your organisation offer for your innovative contribution work?
    (1) Increased basic wage
    (2) Company performance-related compensation (e.g. stock options)
    (3) Bonuses

(4) Various allowances (e.g. overtime payment)
(5) Social wage (in forms of labour insurance and collective welfare benefits)
(6) Symbolic support (e.g. gift)

46. Have you ever received any tangible rewards for your innovative contributions at work?
(1) Yes (2) No

If yes, how often the following rewards are you received for your innovative contribution in the current organisation?

47. Increased basic wages
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

48. Company performance-related compensation (e.g. stock options)
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

49. Bonuses
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

50. Various allowances (e.g. overtime payment)
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

51. Social wage (in forms of labour insurance and collective welfare benefits, e.g. transport subsidies)
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

52. Symbolic support (e.g. gift)
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

53. Which of the following rewards are most attractive to you?
(1) Increased basic wage
(2) Company performance-related compensation (e.g. stock options)
(3) Bonuses
(4) Various allowances (e.g. overtime payment)
(5) Social wage (in forms of labour insurance and collective welfare benefits)
(6) Symbolic support (e.g. gift)

54. Which of the following intangible recognition does your organisation offer for your innovative contribution work?
(1) Promotion
(2) Honour (e.g., public praise, model worker title, compliment, a crowd cheering)

55. Have you ever received any intangible recognition for your innovative contributions at work?
(1) Yes (2) No

If yes, how often the following intangible recognition are you received for your innovative contribution in the current organisation?

56. Promotion
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

57. Honour (e.g., public praise, model worker title, compliment, a crowd cheering)
(Never) ***(Seldom)*** ***(Sometimes)***
(Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

58. Which of the following rewards are most attractive to you?
(1) Promotion
(2) Honour (e.g., public praise, model worker title, compliment, a crowd cheering)

Section F: Training

How often does your organisation:

59. Provide you with on-the-job training, to update your skills?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
60. Send you to any sort of course, to update your skills?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
61. Provide you with planned activity for development?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***
62. How much training do you receive in the past 12 months?
    (Never) ***(Seldom)*** ***(Sometimes)***
    (Often) ***(Fairly often)*** ***(Very often)*** ***(Always)***

Thanks for your time in completing this survey.

Appendix B: Survey Instrument (Chinese Version)

敬爱的雇员，

您被邀请参与由来自澳大利亚塔斯马尼亚大学管理学院的王静静为了完成其博士课题而和她的两位导师，梁博士和梅根博士组织的问卷调查。本研究课题旨在探索可以鼓励员工创新工作行为的企业因素，力图帮助企业探求如何通过企业内可利用资源来促进员工创新行为的方法。

本问卷包含六个部分，预计在 15 分钟内完成。请选出您认为最恰当选项，或者在需要的地方写下您的答案。

本次问卷调查是完全自愿的。您完全有权利拒绝参加。如果您愿意参与本次调查，请您把完成的问卷放入预先提供的信封里，然后归还给负责发放问卷的负责人即可。

本研究对所有参与者保留匿名，对参与者所填写的所有内容予以绝对保密，本次问卷调查所得到的所有数据仅用于本次研究的统计分析，不会涉及识别个人隐私，决不另作其他用途。本研究的所有资料将会被安全的锁在位于澳大利亚塔斯马尼亚大学管理学院的办公室里 5 年，5 年后，所有资料会被安全销毁。

如果您希望就本研究的任何一方面进行讨论，欢迎您随时与王静静联系。本研究已经经塔斯马尼亚社会研究人类研究道德委员会批准。如果您有任何关于本研究的要求或投诉，您可以直接与该道德委员会的执行人员联系（电话+61 3 6226 7479 或电邮至 human.ethics@utas.edu.au ）。届时您需要提供道德编号 H11495。

非常感谢您的参与。 您归还完成的问卷将被认为是您愿意参

与本次调查的体现。

此致

王静静

调查问卷：企业创新机制

A: 基本信息

1. 您的年龄：_____岁
2. 性别：
3. 您的最高学历（单选 √ ）：
   (1)高中及以下　(2)中专或技校　(3)大学专科
   (4)大学本科　(5)硕士　(6)博士
4. 您所在单位所属行业（单选 √ ）：
   (1)制造业　(2)服务业　(3)批发零售业
   (4)教育业　(5)基础设施行业　(6)能源
5. 您所在单位的属性（单选 √ ）：
   (1)国有企业　(2)集体企业　(3)联营企业
   (4)有限责任公司　(5)中外股份合作合资企业　(6)港澳台股份合作合资企业
   (7)外商独资企业　(8)港澳台独资企业　(9)私营企业
6. 您所在单位的员工人数 (人)（单选 √ ）：
   (1)<5　(2) 5-20　(3) 21-100
   (4) 101-200　(5) 201-500　(6) 501-1000
   (7) ≥ 1001
7. 您所在单位成立于____年；或者它已经运营了____（单选 √ ）：
   (1)<1 年　(2) 1-5 年　(3) 6-10 年
   (4) 11-20 年　(5) >20 年
8. 您的工作领域（单选 √ ）：
   (1)销售　(2)市场或广告　(3)财务
   (4)研发　(5)人力人事　(6)行政
   (7)专项技术　(8)生产或运营　(9)其他
9. 您在现在这个单位的工作时间（单选 √ ）：
   (1)<3 个月　(2) 3 个月-1 年　(3) 1-3 年
   (4) 3-5 年　(5) 5-10 年　(6) 10-20 年
   (7) >20 年

请回答每道问题，选出您认为最恰当选向（单选√ ）：

B:

在您的工作中，您多久：	从不	很少	有	经	相	非	总是
10. 寻找可以改进现有工作的机会？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11. 意识到有给您工作带来积极变化的机会存在？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12. 在工作中留意非常规的事务？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
13. 产生针对您工作中现存问题的想法或解决方案？	**1**	**2**	**3**	**4**	**5**		**7**
14. 统观全局以得到对该现存问题的更深层了解？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
15. 尝试新点子？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16. 检验针对现有问题的解决方案？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17. 评价新点子的优点和缺点？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18. 实施那些看起来可以让您的工作更简单更有效率的变化？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19. 排除在现有工作过程中应用新方法时的障碍？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
20. 应用新点子去改进现有工作过程？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
21. 试图说服别人关于您的新点子或者解决方案的重要性？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
22. 积极把新点子推荐给同事使它们有机会被他人应用？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
23. 积极把新点子推荐给上级使它们有机会在公司范围内应用？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24. 愿意承受风险去应用自己的新点子？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
25. 愿意承受风险去推行促进自己的新点子？	**1**	**2**	**3**	**4**	**5**	**6**	**7**
26. 愿意承受风险去支持同事的新点子？	**1**	**2**	**3**	**4**	**5**	**6**	**7**

C: 上下级关系：

	强烈	不同	有	既	有	同	强烈同意
27. 您跟您上司在工作中相互支持。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
28. 您和您上司的工作关系非常有效率。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29. 您知道上司对您工作表现的满意程度。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
30. 您的上司理解您工作中的问题和需求。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
31. 您的上司能意识到您的潜能。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
32. 您的上司会运用他的权利帮您解决您工作中的问题。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
33. 您的上司愿意承担责任帮您渡过难关。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
34. 您对您上司的决定有信心，即使上司不在场时您也愿意维护支持他的决定。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
35. 您目前与上级的关系有助于您在工作中:							
a. 产生新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 实施您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 传播扩散您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**

D: 工作中的交往：

在同一个工作领域或工作部门，您：	从不	每天	每周	每月	每季度	半年	一年一次	
36. 与有类似工作任务的员工交流。	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
37. 与工作任务和你不同的员工交流。	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
与你不同工作领域或工作部门的人，您：								
38. 与有类似工作任务的员工交流	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
39. 与工作任务和你不同的员工交流。	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
40. 在你的日常工作中，你每天大概跟几个人接触交流？	**1=**	**2=*1-***	**3=*4-***	**4=*7-***	**5=*10-***	**6=*13-***	**7=多**	***15***
与你公司以外的人的工作交流，您：	从不	每天	每周	每月	每季度	半年	一年一次	

41. 代表公司参加会议，展销会或者博览会等活动。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
42. 代表公司与顾客保持联系。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
43. 代表公司与同行业其他公司保持联系。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
44. 代表公司与研究机构 / 大学保持联系。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
45. 您目前工作中的交往有助于您在工作中:	强	不同	有	既	有点	同意	强烈同
a. 产生新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 实施您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 传播扩散您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**

E: 奖赏和表扬：

46. 如果您工作中有创新，您多久会得到一次如下奖赏和表扬？	从不	很少	有	经	相	非	总是
a. 增加基本工资	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 股票	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 奖金	**1**	**2**	**3**	**4**	**5**	**6**	**7**
d. 补贴（如加班费）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
e. 社会保障（如劳动保险，集体福利）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
f. 晋升	**1**	**2**	**3**	**4**	**5**	**6**	**7**
g. 荣誉（如公开表扬，劳动标兵称号，为您举办庆祝活动）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
h. 象征性奖励（如礼物等实物鼓励）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
47. 您认为哪一种奖赏和表扬对您有吸引力？	强烈	不同	有	既	有	同	强烈同意

a. 增加基本工资	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 股票	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 奖金	**1**	**2**	**3**	**4**	**5**	**6**	**7**
d. 补贴（如加班费）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
e. 社会保障（如劳动保险，集体福利）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
f. 晋升	**1**	**2**	**3**	**4**	**5**	**6**	**7**
g. 荣誉（如公开表扬，劳动标兵称号，为您举办庆祝活动）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
h. 象征性奖励（如礼物等实物鼓励）	**1**	**2**	**3**	**4**	**5**	**6**	**7**
48. 您目前所获得的奖赏和表扬，有助于您在工作中：							
a. 产生新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 实施您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 传播扩散您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**

F: 培训：

您的公司：	强烈	不同	有	既	有	同	强烈同意
49. 为您提供在职培训来提高你的业务水平和技能。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
50. 派您去参加一些课程来提高业务水平和技能。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
51. 为您提供其他有利于你职业发展的活动。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
52. 过去一年您公司为您提供的培训机会满足您的需求。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
53. 您目前所接受过的培训有助于您在工作中:							
a. 产生新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
b. 实施您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**
c. 传播扩散您的新点子。	**1**	**2**	**3**	**4**	**5**	**6**	**7**

谢谢您的热心参与！